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User hits AT&T with $10m toll fraud suit

By Barton Crockett
Senior Editor

NEW YORK — Mitsubishi International Corp. has filed a $10 million lawsuit charging AT&T with, among other things, breach of contract and fraud stemming from security problems with an AT&T PBX that hackers used to make thousands of international calls.

In what could be the first instance of a user suing a vendor over toll fraud, Mitsubishi filed suit on June 14 in New York District Court, claiming AT&T failed to warn of the System 85's vulnerability to toll fraud and later bungled the job of preventing hackers from calling through the private branch exchange.

The company is seeking $430,000 to cover unauthorized toll charges and an additional $10 million in punitive damages. Furthermore, Mitsubishi wants AT&T to reimburse it for approximately $30,000 per month in increased calling charges accrued since it was forced to shut off the switch's remote access feature in September.

Mitsubishi said a key reason it bought the System 85 was to re-

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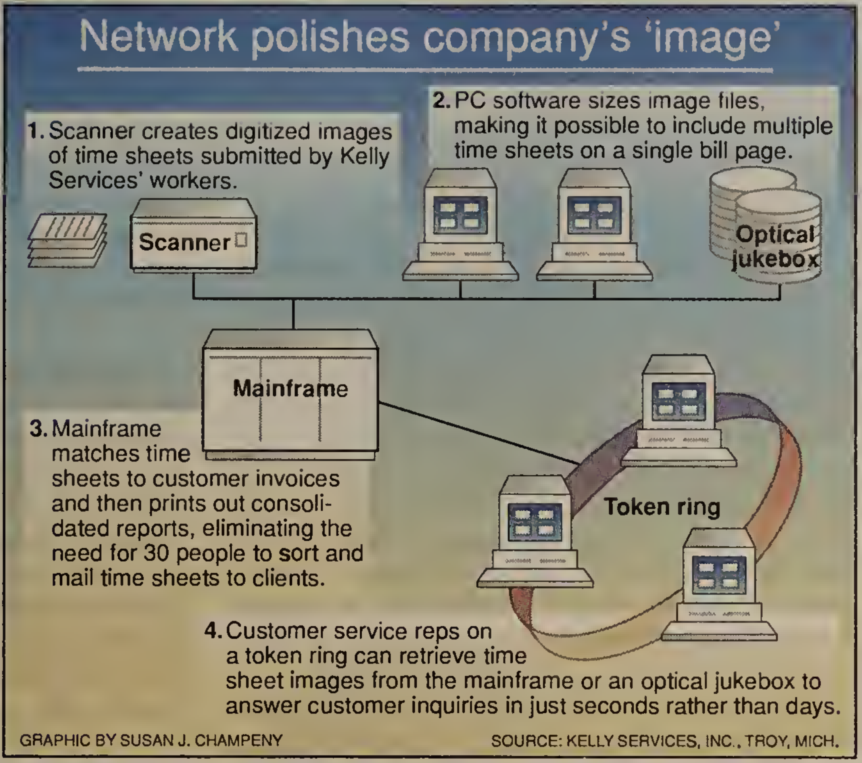
Network polishes company's 'image'

1. Scanner creates digitized images of time sheets submitted by Kelly Services' workers.
2. PC software sizes image files, making it possible to include multiple time sheets on a single bill page.
3. Mainframe matches time sheets to customer invoices and then prints out consolidated reports, eliminating the need for 30 people to sort and mail time sheets to clients.
4. Customer service reps on a token ring can retrieve time sheet images from the mainframe or an optical jukebox to answer customer inquiries in just seconds rather than days.

GRAPHIC BY SUSAN J. CHAMPENY
SOURCE: KELLY SERVICES, INC., TROY, MICH.

Kelly Services ups service ante with image network

System streamlines invoicing, saves $1m a year.

By Caryn Gillooly
Senior Editor

TROY, Mich. — Kelly Services, Inc. has installed an imaging network that has enabled it to improve customer relations while saving the company more than a million dollars per year.

Kelly Services, based here, uses the imaging system to process 55,000 invoices each week and handle more than 100,000 weekly time sheet records for the part-time employees it dispatches to corporate clients.

The network has improved the accuracy and format of customer bills by enabling Kelly Services to deliver invoices with images of time cards instead of actual copies of the cards. It also lets Kelly Services customer service representatives access image records in seconds instead of keeping customers waiting for days while paper records are manually searched.

According to Walt Bellano, senior director of information pro-

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IBM fortifies FEPs; NET adds new router

IBM unveils two 3745 models, Ethernet, TCP/IP, frame relay support; NET airs mux-based router.

By Paul Desmond
Senior Editor

NEW YORK — IBM last week rolled out two new models of its 3745 Communication Controller and announced frame relay, Ethernet and Transmission Control Protocol/Internet Protocol support for the entire 3745 line.

IBM also shared the stage with Network Equipment Technologies, Inc. (NET), which unveiled the Local-area network/Wide-area network Exchange (LWX), a LAN router/packet-switching module for NET's IDNX T-1 multiplexer, which IBM resells.

The Travelers Corp. of Hartford, Conn., has been testing the LWX since February (see story below).

Analysts said the announcement of Ethernet, TCP/IP and frame relay support for the 3745 — none of which will be available until late next year — is intended to stem the tide of user migration to backbone nets based on multiprotocol routers.

"They're doing all they can to keep this ancient product alive," said David Passmore, a partner with Network Strategies Practice, a network consulting practice of Ernst & Young in Vienna, Va. "I think the critical issue for IBM is how to hang onto their installed base of network customers [and keep them from migrating] to this new router-based environment."

Ellen Hancock, IBM vice-president and general manager of IBM's Networking Systems —

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INSIDE
SNMP
Buyer's Guide to products that work with this new management protocol. See page 41.

IBM-Novell: Strategic or convenient?

By Timothy O'Brien
West Coast Bureau Chief

When IBM and Novell, Inc. announced their joint marketing agreement last February, analysts and users applauded the move. But the partnership between the two market giants is now raising some concerns that were overshadowed by the early enthusiasm.

ANALYSIS

When announcing the agreement, IBM said it was "listening to users" while Novell claimed to be "growing the LAN market." But a closer look at IBM's motivations highlights some problems that may lie ahead for Novell.

Some analysts suspect that IBM's motives were rooted in its need to shore up the shifting loyalties of information systems (IS) managers, use NetWare deals to drive IBM hardware sales and ensure that Novell's dominance in departmental local-area networks wouldn't interfere with IBM's broader enterprise network strategy.

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NETLINE

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NOVELL, MICROSOFT strike off in opposite directions with their approaches to LAN management. Page 2.

VENDORS LINE UP to make network announcements at this week's PC Expo. Page 4.

CHANGES ADRIFT in the videoconferencing market could slash prices for high-end systems. Page 6.

SPRINT INTERNATIONAL unwraps service that lets users exchange EDI documents using X.400. Page 6.

A NEW FORUM takes shape with the mission of helping users make the move to switched digital services. Page 6.

FTS 2000 USERS voice myriad complaints about the government network. Page 7.

NEWSPAPER

FEATURE

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Early user's view of NET's new LWX router

By Steve Simon
Special to Network World

The Travelers Corp. recently found that its extensive network of interconnected LANs had gotten too big for its bridges.

The Hartford, Conn.-based insurance firm's network comprises more than 200 4M and 16M bit/sec token-ring local-area networks interconnected by IBM source routing bridges. To remedy problems created by the bridges' limited functions, The Travelers began looking at different types of routers.

Then a unique opportunity presented itself — the chance to serve as a test site for Network Equipment Technologies, Inc.'s (NET) LAN/WAN Exchange (LWX) router.

BEHIND THE NEWS

The LWX, which was announced by IBM and NET last week, is a card that resides in NET's Integrated Digital Net-

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LAN management options still leave users wanting

First of two articles examining Microsoft network management strategy, Novell's new architecture.

By Caryn Gillooly
Senior Editor

It is no secret that local-area network management is at the forefront of users' minds, particularly with the pending release of Novell, Inc.'s net management strategy.

Until now, Novell and Microsoft Corp. have had fairly similar approaches to LAN management, both providing individual utilities to manage LAN functions, instead of a cohesive set of products for centralized LAN management.

This week, however, that picture will begin to change. Novell will unveil its Novell Network Management Architecture, which will provide a platform for managing NetWare networks, hooks into enterprise net management systems and application program interfaces (API) that third parties can use to build LAN management applications for NetWare.

The common APIs will make it possible for different management applications — for hardware, software and application management — to exchange information and send data to a centralized management system.

The closest users get to this type of management today is through the Transmission Control Protocol/Internet Protocol's Simple Network Management Protocol (SNMP), the Open Sys-

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J.C. Penney urges RBHCs to speed up PRI tariffing

Meeting with carriers to promote its ISDN vision.

By Bob Wallace
Senior Editor

DALLAS — Network executives from J.C. Penney Company, Inc. will meet this week with officials of the RBHCs in an effort to hasten tariffing of ISDN Primary Rate Interface (PRI) and spur wider deployment of the service.

J.C. Penney wants to use Integrated Services Digital Network PRI service to support local-area network interconnection and imaging at as many as 1,000 retail stores across the nation by 1993 ("J.C. Penney looks to ISDN PRI as way to link stores," *NW,* Feb. 11).

But the plodding pace of PRI tariffing by local telephone companies, coupled with high recurring charges and limited availability of local PRI offerings, threaten the retailer's effort to gain a market edge with ISDN.

Pent-up demand

"We are meeting with each RBHC and GTE [Corp.] to explain the opportunity for ISDN within J.C. Penney and in a segment we call the branch office market," said Robert Valliere, J.C. Penney's senior project manager of communications systems. "We see a pent-up demand for data applications here that PRI could handle."

Thus, the retailer has gone on

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Spectrum Concepts tool eases software distribution

By Paul Desmond
Senior Editor

NEW YORK — Spectrum Concepts, Inc. this week will unveil a product that automates the process of distributing software or data to remote host- or LAN-attached workstations and servers.

Spectrum Concepts' XCOM Software Distribution System (XCOM/SDS) is designed to help users with large networks better manage the process of scheduling software upgrades or modifications, distributing software and maintaining detailed accounting.

It can also be used to distribute any data file and complements the distribution capabilities of Novell, Inc. NetWare servers.

The product is the first in a series of management tools Spectrum Concepts is promising to deliver by year-end 1992, said Meyar Sheik, director of marketing for the company. Future products will address centralized data backup, asset management that will help users track software usage for licensing and chargeback purposes, remote diagnostics and configuration management for both hardware and software.

XCOM/SDS, to be announced at the PC Expo show here this

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Briefs

New SNMP test complete. Because of its potential as a universal management tool, vendors are planning to use the Simple Network Management Protocol (SNMP) in hundreds of different products. But, like many new standards, SNMP will pass through a rocky stage in which incompatible SNMP versions appear, making it unclear whether SNMP products are mature enough to buy. *Network World* and AT&T Bell Laboratories designed the SNMP Test Series in order to answer that question. The second article in the series, taking a critical look at the SNMP implementations of nine popular routers, will run in *Network World* next week.

IBM launches NetView/PC on Unix. Along with its front-end processor announcements (see "IBM fortifies FEPs; NET adds new router," page 1), IBM last week unveiled the AIX NetView Service Point, essentially an AIX version of NetView/PC. Running on a RISC System/6000 or Sun Microsystems, Inc. SPARCstation or SPARCserver, the new software lets Unix machines and management systems exchange management data with NetView. Like NetView/PC, the product requires third-party or user-developed applications to support attached management systems or devices. It will be available next month and is priced at $3,150.

IBM also announced enhancements that enable the NetView Performance Monitor (NPM) to collect data from its Token-Ring Network bridges and local-area networks, enabling a NetView operator to monitor LAN utilization and performance. The enhancements will be available with Version 1 Release 5 of NPM in February 1992. MVS pricing ranges from $26,300 to $97,580, while VM pricing ranges from $5,155 to $63,780.

DEC readies token-ring push. Digital Equipment Corp.'s token-ring introduction this week at PC Expo in New York will be highlighted by an agreement between DEC's Networks and Communications group and Proteon, Inc. for the joint development of microcomputer adapter cards, hubs, bridges and routers supporting token rings. However, specific product and pricing information will not be made available and DEC's PathWorks for Token Ring product line is not slated for release until the fall.

Further clouding the picture is a separate agreement that will also be announced this week between DEC's Personal Computer Systems Group and Interconnections, Inc. for the joint development of token-ring connectivity software.

Gates reveals 'nightmare.' According to reports published last week, William Gates, chairman of Microsoft Corp., recently issued an internal memo warning his top executives that competitors are getting tougher. In the memo, which Gates wrote in April, he said, "Our nightmare — IBM 'attacking' us in system software, Novell [Inc.] 'defeating' us in networking and more agile, customer-oriented applications competitors getting their Windows act together — is a reality."

Novell licenses protocols. Novell, Inc. last week announced the creation of the NetWare Transports Licensing Program (NTLP) to let third-party developers license Novell's Internet Packet Exchange (IPX) and Sequenced Packet Exchange transport protocols. According to Novell, the NTLP offers two licensing options. The first will let companies distribute native NetWare client software with their net applications and hardware products, while the second will allow developers to license source-code modules for use in new net products.

Teleport gets new investor. Merrill Lynch & Company, Inc. last week announced that it has agreed to sell 12.5% of its wholly owned Teleport Communications Group subsidiary to Cox Enterprises, Inc. Terms of the agreement were not disclosed, but Merrill Lynch and Cox said they would provide $80 million of additional funding to the alternative access carrier for future expansion. Cox, based in Atlanta, is a media conglomerate that owns cable television systems and newspapers, as well as television and radio stations.

In related news, as expected, Teleport's unit, Teleport Communications-Dallas, last week agreed to buy the assets of DFW/MetroLink, Inc., an alternative access carrier that earlier this year filed for Chapter 7 liquidation under federal bankruptcy law. DFW/MetroLink's 15-mile fiber-optic network will supplement Teleport's existing network, which went into operation earlier this year.

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1988 *Sprint awarded 40% of Federal Telecommunications System 2000 contract. First to deploy SS7 nationwide.* 1990 *Sprint announces the first commercial video services to the Soviet Union.*

Host of vendors ready to unveil wares at PC Expo

By Caryn Gillooly
Senior Editor

NEW YORK — The ninth annual PC Expo conference to be held here this week will feature network announcements from Apple Computer, Inc., Ashton-Tate Corp., Microsoft Corp. and Novell, Inc., as well as a host of other vendors.

The highlight of the conference will be Novell's official unveiling of the Novell Network Management Architecture, the company's NetWare 3.X-based management solution for local-area network management and application development.

The focus of the architecture, according to a white paper to be issued this week by Novell, is "on providing the [information systems] manager with increased access to information on NetWare networks and resources. Novell's priority is to provide applications to manage NetWare networks."

According to the document, in developing the architecture, Novell is striving to accomplish three main goals: provide a platform for managing NetWare networks and resources; integrate third-party LAN management applications through a published set of application program interfaces; and provide hooks into IBM's NetView network management system for enterprisewide net management.

Contrary to current rumors, Novell will not announce — at least not at PC Expo — a low-end peer-to-peer network operating system, although Executive Vice-president Darryl Miller admitted Novell has something in the works.

"We're going to have things at a higher level and we're going to have things at a lower level than we offer now," Miller said. "We'd be spreading ourselves too thin if we got into applications. But as long as we just do networking we'll be okay."

Contrary to current rumors, Novell will not announce a low-end peer-to-peer network operating system.

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Other splashes

Ashton-Tate will use the show to announce, in conjunction with Microsoft, dBase IV for SQL Server, a version of the data base software that will serve as a front end for Microsoft's SQL Server data base

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Group accuses FCC of ignoring their concerns about price caps

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Challenging FCC assurances that service quality won't erode under price cap regulation, three prominent user groups joined a dozen other parties last week in requesting that the agency take another look at the issue.

The coalition, headed by the Tele-Communications Association, Inc. (TCA) filed a stinging petition with the Federal Communications Commission claiming that concerns about service quality have been largely ignored by the agency.

Other members of the group include the Ad Hoc Telecommunications Users Committee, Boeing Computer Services Co. and the International Communications Association, as well as consumer groups, trade associations and long-distance providers.

Critics of the FCC's price cap plan for local exchange carriers believe the regulation gives carriers incentives to skimp on investment in network technology and maintenance. If carriers can cut costs, price cap regulation would allow them to keep most of those savings as profit.

The petition stated that a host of problems could emerge under price cap regulation: Users could face delays in getting new lines installed, receiving trouble reports and having service restored after an outage. Because service quality erosion could disrupt computer communications, users also may be forced to employ more costly alternate connections.

In its petition, the coalition complained the FCC has rejected without explanation requests for enhanced service quality reporting procedures from users and vendors. "This creates the unfortunate impression that the [FCC] is reflexively

(continued on page 7)

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NET to unveil new feeder mux and expert system for net mgmt.

ADNX/60 mux can expand the reach of an IDNX network.

By Paul Desmond
Senior Editor

REDWOOD CITY, Calif. — Network Equipment Technologies, Inc. (NET) this week will announce an expert system for managing networks based on NET devices and a new feeder multiplexer.

The new ADNX/60 follows the ADNX/48 as the second in NET's line of multiplexers designed to feed voice and data traffic to larger NET IDNX backbone nodes.

According to Mary Johnston, principal with Northeast Consulting Resources, Inc. in Boston, the device is targeted at the European market because it supports two trunks of up to 256K bit/sec each, which makes it a good fit given the pricing of private circuits in Europe.

But the ADNX/60 will also help U.S. users because it can route traffic to multiple adjacent IDNX nodes, thus expanding the reach of an IDNX net beyond its technical limit of 256 nodes. In practice, the limit is far less than that, sources said.

The ADNX/60 uses a different trunk protocol than the IDNX, but the same IDNX priority scheme for call placement and rerouting can be employed across a network of IDNXs and ADNX/60s.

The ADNX/48, which supports a maximum of two full T-1s but is priced less than the ADNX/60, cannot be used that way, Johnston said. The ADNX/48 is also not supported under NET's Series 5000 management system, unlike the ADNX/60.

ADNX/60 trunks can be configured at speeds from 9.6K to 256K bit/sec. The device can support as many as six voice ports or 20 data ports ranging in speed from 1,200 to 64K bit/sec. NET will also offer 8K and 16K voice compression modules.

Scheduled for fall delivery, the ADNX/60 is priced starting at $6,000.

The Series 5000 management system has been enhanced with the addition of Expert Fault Management System (EFMS) software, a rule-based package that automates fault management for NET networks. It runs on the same Sun Microsystems, Inc. workstation as the Series 5000 and supports problem detection, correlation and prioritization. It also offers repair recommendations for various problems.

NET has used the software itself but is now making it available for users to run on their own.

EFMS software can also be used with a new After-hours Fault Management Support (AFMS) service to automatically transmit information about network problems to an NET technical assistance center.

EFMS is available now; its pricing starts at $30,000. Pricing for the AFMS service will vary according to network configuration, among other things. ◘

Correction: The OSINET was incorrectly described in the June 17 story "Users testing OSI FTAM products face problems." OSINET is a logical network based on services provided over AT&T Accunet Packet Service and Sprint Data Group public data networks. OSINET is administered by OSINET Corp. of McLean, Va., not by the Corporation for Open Systems International, as the article stated.

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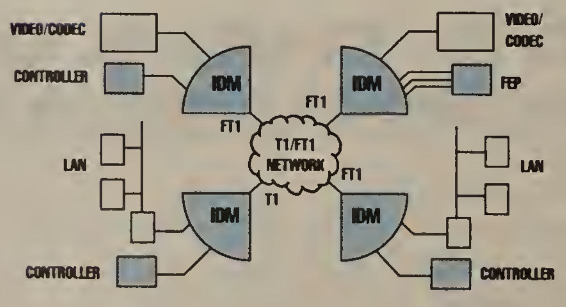

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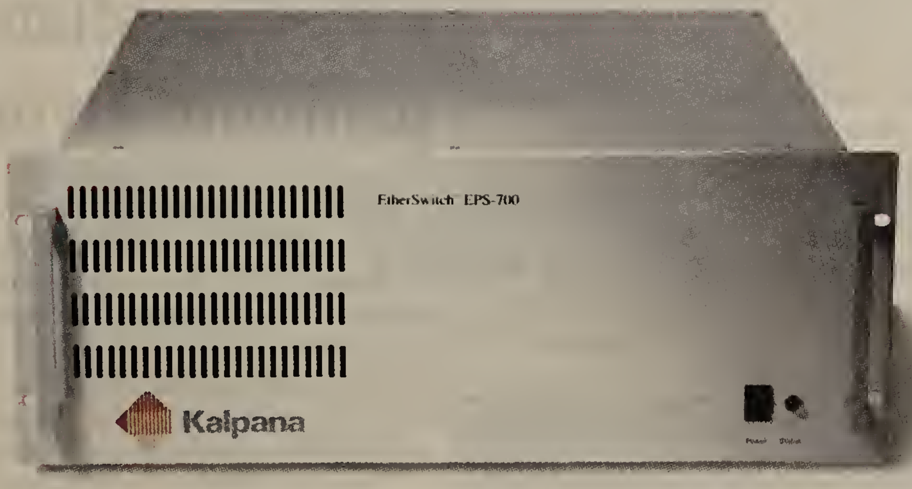

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LAN MAGAZINE 1991 PRODUCTS OF THE YEAR

Circle Reader Service #118

CLI announces revised version of Rembrandt

By Barton Crockett
Senior Editor

SAN JOSE, Calif. — Compression Labs, Inc. (CLI) this week will introduce videoconferencing products that cost 30% less than its current high-end systems, while, separately, BT North America, Inc. will announce plans to sell videoconferencing systems in the U.S.

The announcements could cripple BT North America's current U.S. distributor and shake up the videoconferencing industry by changing the price/performance ratio for high-end systems designed to use 384K bit/sec and higher speed transmission facilities.

According to Al Lill, a director at Gartner Group, Inc., a market research firm in Stamford, Conn., CLI's new Rembrandt II/VP videoconferencing systems support speeds ranging from 56K bit/sec to the European T-1 equivalent of 2.048M bit/sec. It supersedes Rembrandt II/06, which supports links at speeds ranging from 56K to 384K bit/sec, and the company's Rembrandt system, which operates at speeds from 384K to 2.048M bit/sec.

At speeds greater than 384K bit/sec, the price/performance of the Rembrandt II/VP line is much better than high-end systems from NEC America, Inc. and GPT Video Systems. At lesser speeds, the product offers similar picture quality to videoconferencing systems from PictureTel Corp. but costs 6% to 22% more, Lill said.

PictureTel leads the low-end marketplace but does not sell high-end videoconferencing systems.

The basic Rembrandt II/VP hardware platform costs $26,000, while the four compression and picture resolution software packages available for the system range in price from $4,000 to $21,500.

Application Package One supports CLI's proprietary Cosine Transform Extended (CTX) video compression algorithm and the new CCITT Px64 compression algorithm and CCITT Quarter Common Intermediate Format (QCIF) resolution. CTX supports video communications between CLI devices, while Px64 and QCIF are new CCITT standards for videoconferencing between various vendors' systems. Application Package One costs

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Wang embraces software shift with IBM bailout

By Bob Brown
Senior Editor

ARMONK, N.Y. — IBM and Wang Laboratories, Inc. last week announced an agreement under which Wang will resell IBM's Application System/400 minicomputers as well as RISC System/6000 and Personal System/2 microcomputers and IBM will invest as much as $100 million in the ailing office systems vendor.

The relationship, which unites the once hostile rivals, signals a dramatic shift for Wang away from hardware to software development and systems integration.

The move is consistent, however, with Wang's recently announced Office 2000 product strategy, under which Wang said it planned to offer image management and other office automation software on a variety of platforms.

Wang plans to offer the RISC System/6000 and PS/2 as its desktop hardware products of choice and will sell them under its own logo. It also intends to port

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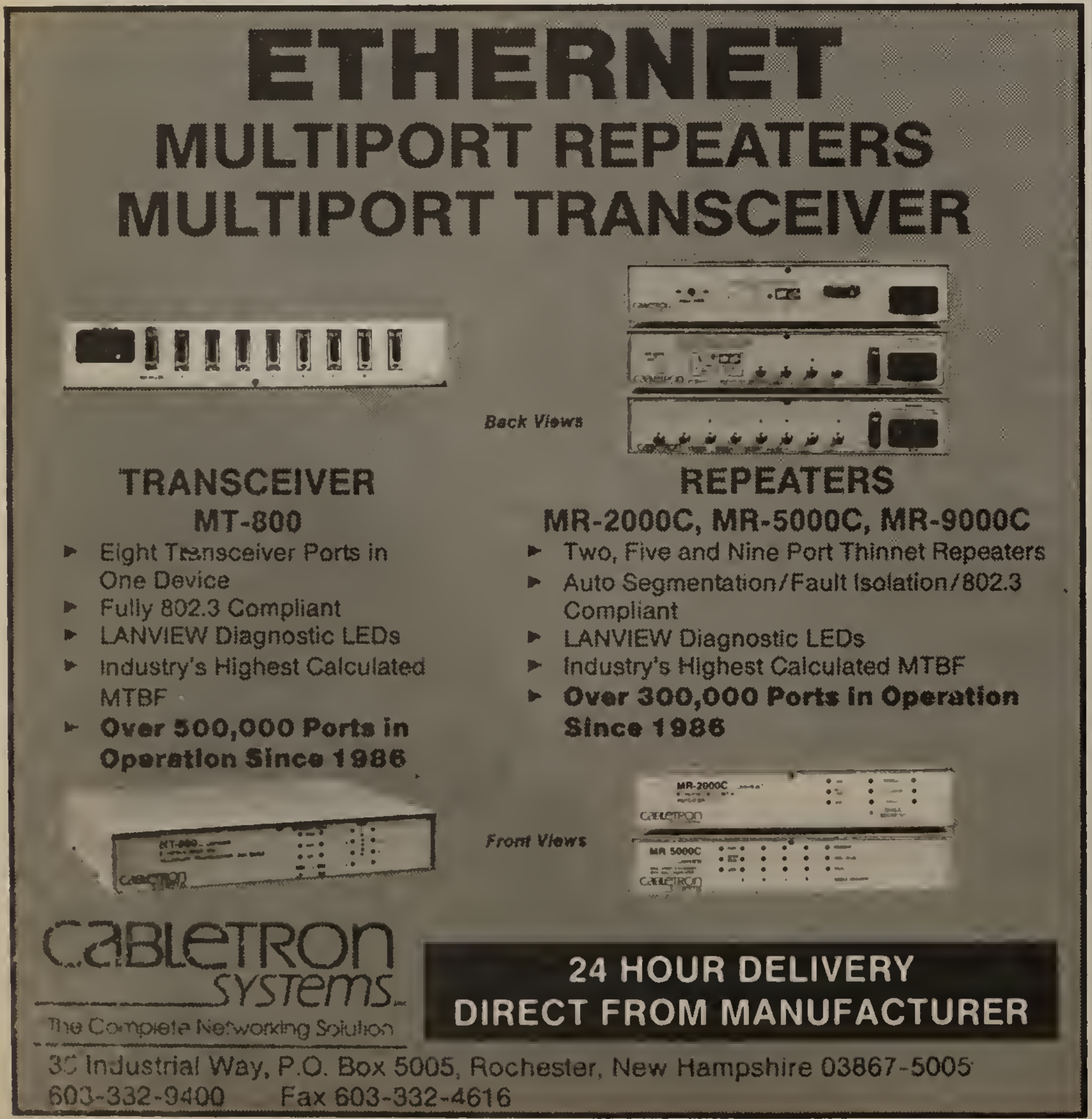

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Back Views

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Sprint International service allows EDI document exchange over X.400

Other new service links cc:Mail LANs to SprintMail network.

By Wayne Eckerson
Senior Editor

WASHINGTON, D.C. — Responding to increasingly intense competition in the value-added network (VAN) market, Sprint International last week announced a new service that will enable users to exchange EDI documents using X.400.

In addition, Sprint International announced Sprint Message Xchange for LANs, an X.400-based service that will enable users of cc:Mail's local-area network messaging system to exchange messages with users on SprintMail, Sprint International's public electronic mail network.

The electronic data interchange service enables users to transmit EDI documents to multiple trading partners via X.400 instead of establishing direct links to each supplier, according to John Sherburne, director of product planning for messaging at Sprint International in Reston, Va.

This will immediately benefit large companies that support an X.400 gateway for external messaging and a separate network for EDI communications, he said.

"We have a number of clients, especially in the aerospace industry, that support separate networks for messaging and EDI," Sherburne said. "This service would let them bundle their communications, which will cut down on administrative overhead and reduce costs."

The EDI/X.400 service follows similar announcements during the past year from AT&T, BT North America, Inc., GE Information Services, IBM and MCI Communications Corp.

Sprint International will route EDI documents to any SprintMail or SprintEDI service subscriber or to any user whose E-mail network is linked to SprintNet, even if it does not support X.400, Sherburne said. SprintNet is connected to all U.S. VANs and about 20 international VANs.

The service supports all EDI standards and will handle translation among different EDI formats. It will also take a non-EDI electronic document and convert it to the proper EDI format.

In addition, the EDI/X.400 service will deliver EDI documents via facsimile, telex or postal mail. This allows X.400 users to support trading partners that are not yet EDI-capable, a requirement for large companies with hundreds of small suppliers, Sherburne said.

Announcement of the Sprint Message Xchange service represents Sprint Inter-

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U.S., Canadian vendors team up to promote switched digital services

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — A group of local and long-distance carriers and equipment manufacturers from the U.S. and Canada will meet next month to finalize the formation of a new association to promote switched digital services and products.

The group, dubbed the Switched Digital Services Applications Forum, held a preliminary meeting in March to discuss the formation of the association. About 100 people from 60 organizations attended that meeting in Atlanta.

The group wants to ease users' transition to switched digital services by focusing on technical issues such as interoperability and working to ensure inexpensive and ubiquitous access to such services, said Brad Fletcher, product manager of switched data services at Sprint Data Group, a subsidiary of US Sprint Communications Co. The carrier is one of the firms involved in organizing the forum.

Fletcher said one of the issues to be worked out at the July meeting is how the group might interact with standards bodies to resolve technical issues related to switched digital services. Although US Sprint has been the only long-distance carrier involved to date, Fletcher said both AT&T and MCI Communications Corp. are expected to send representatives to speak at the group's July meeting. Local carriers are participating as well.

The group will also focus on educating users about applications that can be supported with the new services, said Diane Thorne, coordinator for the forum. Initially, the forum will focus on applications for switched 56K bit/sec services, including Group IV facsimile, videoconferencing, bulk file transfer and medical imaging.

In the future, the group will probably look at applications for services other than switched 56K bit/sec, such as frame relay.

The forum will meet in mid-July in Richardson, Texas, to vote on its charter and bylaws and to conduct other business necessary to formally organize, Thorne said. Public introduction of the group will be made at a meeting in the fall, she added.

At the March meeting, attendees began work on the group's charter, formed working committees and elected a five-member steering committee. Bernie Schneider, director of product management for Sprint Data Group, was chosen as president of the forum. He also serves on the steering committee and will head a working group on policy and administration.

Roland Zalite of Northern Telecom, Inc. will head the interoperability committee, Ron Newton of Newbridge Networks, Inc. will head the products and services committee, Larry Martin from Videotelecom Corp. will chair the promotion and education committee, and Cliff Doyle from BellSouth Corp. will head the switched access committee.

Only firms that provide switched digital products or services, including value-added resellers, are eligible for membership. Fletcher said he expects that users and consultants will be permitted to join the group as nonvoting members.

For more information about the group, contact Thorne at (703) 689-5654.

AT&T FTS 2000 customers air their grievances

By Ellen Messmer
Washington Correspondent

DENVER — AT&T's FTS 2000 customers last week delivered a no-punches-pulled critique on the government network at the first annual Federal Telecommunications System 2000 user conference here.

The list of grievances, assembled by more than 300 network managers attending the four-day FTS 2000 Network A User Forum, included lost order forms, inaccurate billing, inadequate digital local access, interoperability problems and a host of other issues. Network A is the portion of FTS 2000 managed by AT&T.

The FTS net, which supports over 700,000 users, is considered to be the world's largest private network.

Officials from AT&T and the General Services Administration — the government's FTS 2000 contract administrator and billing coordinator — promised to formally address the list of complaints within 30 days.

Forum participants, who represented virtually every government agency, divided into five working groups to address specific services and improvements.

The groups covered billing and service ordering; packet-switched services and electronic mail data networks; switched voice services; switched digital integrated service and access optimization; and compressed video.

Although the working group meetings were closed to outside observers, evidence of the vitality of discussions was apparent by the handwritten placards taped to the walls identifying problems. The "handwriting on the wall" from the data nets group listed such complaints as poor support during packet-switched services testing and poor communications with users.

Jim Dolezal, chief of the telecommunications systems division at the Department of the Interior and nominated chairman of the users' Executive Steering Committee commented on the mood of the forum. "In some cases, it was very emotional but very amiable," he said. "We want to improve the services. It's an excellent forum to find out the problems the agencies are having."

Air Force Maj. Tom VanDerPloeg, chief of the policy and systems division of the Air Force Telecommunications Certification office, spoke for the billing and service ordering workshop.

"We're not sure where prices are anymore," he said. "There should be some automated service when you're ordering to know what prices are."

(continued on page 74)

Group accuses FCC of ignoring concerns

continued from page 4

opposed to assuming any meaningful service quality responsibilities, no matter how necessary, and that it will not even listen to users' concerns," the petition stated.

The group said its fears about service quality erosion are so great that it had to make one last effort to persuade the agency to rethink the issue. "TCA is filing this application for review because of the genuine possibility that [local carriers] will adopt cost-cutting measures that hurt users and decrease the efficiency and productivity of telecommunications-dependent businesses," the petition stated.

The FCC has set up service quality reporting requirements for local carriers once price cap regulation takes effect in July, but the coalition said the agency's plan falls far short of the necessary safeguards.

"While the reporting requirements create the illusion of oversight, they are toothless, susceptible to manipulation and incapable of detecting all but the grossest declines in quality," the petition stated.

The group outlined five measures it believes are vital to improve quality monitoring and to provide more information on network performance.

First, the group asked the FCC to require the local carriers to publish their internal net performance standards in tariffs to help users plan their networks more effectively, ensure that the local carriers justify changes in their standards and provide advanced notice of reduced performance.

The group also asked the FCC to establish a user forum through which customers could work with carriers to establish uniform network standards. The TCA said it has proposed this step in individual filings in the past, but agency officials have opposed the idea.

Also, the petition requests a quarterly report on network availability and bit error rates. The group said this step is feasible and particularly necessary for users with heavy data traffic. The filing stated that the FCC has ruled out such reports as too burdensome and costly. The group said the service quality reports currently proposed by the FCC are too aggregated and that problems in some geographic or rural areas could be masked.

The filing asked the FCC to require reporting by service area and on a wire-center level. The petition also asked that monitoring reports present data on a service-by-service basis rather than by access category, as is proposed by the FCC. ◘

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

"NCR [Corp.] becomes the core of AT&T's computer business. Its name stays the same, its people and structure remain in place, its world headquarters stays right here in Dayton, and NCR's leadership will be running the show."

Robert Allen
AT&T Chairman
Speaking during his first visit to NCR headquarters in Dayton, Ohio, since NCR agreed to be acquired by AT&T last month.

People & Positions

DuWayne Peterson, former executive vice-president of operations/systems and telecommunications at Merrill Lynch & Company, Inc., has been named to the board of directors at **Parallan Computer, Inc.** Peterson will help define the long-term objectives for Parallan, a Mountain View, Calif., manufacturer of superservers.

Gary Fitts, the original architect of the TOPS network operating system, last week rejoined **Sitka Corp.** (formerly The TOPS Division of Sun Microsystems, Inc.), serving as vice-president of technology in a newly created position.

Fitts will be responsible for heading Sitka's OpenTOPS project, a major enhancement to SitkaTOPS, the company's network operating system that supports multiple hardware platforms and operating systems.

By eliminating SitkaTOPS' reliance on Apple Computer, Inc. AppleTalk protocols, the company has enabled users to benefit from broader networking options, according to a Sitka spokeswoman.

Fitts recently completed a one-year leave of absence from Sitka.

Timeplex approaches new challenges with optimism

President Osman discusses mux maker's future.

Q&A Unisys Corp.'s sale of its Timeplex, Inc. subsidiary two weeks ago to a partnership of two foreign firms ended months of speculation about the fate of the worldwide T-1 multiplexer market's biggest player, which Unisys has been looking to sell off for some time. But given the unfamiliarity of Ascom Holding A.G. and Mercedes Information Technologies, Inc., Timeplex's new parents, questions about Timeplex's future remain.

Dewaine Osman, who will remain president of Timeplex, recently discussed with *Network World* Senior Editor Bob Brown the ramifications of the Timeplex sale and its effect on users and the company itself.

What does the sale of Timeplex mean to users?

It's a positive development that we've got continuity. It is the most important thing for the customers to concentrate on. The [Timeplex] name is not going to change, the organization isn't going to change, the management team isn't going to change, we're not going to increase or decrease staff, and we'll continue our R&D program.

What changes will customers notice?

Customers shouldn't see a major change, certainly in the short term. We are implementing a [product development] plan right now, and we intend to continue on that. Ascom continues to say that Timeplex will be the core business entity for future long-term development. I believe there will be opportunities for synergy identified as we move forward and that Ascom's technology and distribution channels will be helpful to us. They bring a point of view about the PTTs and

(continued on page 11)

Dewaine Osman

INDUSTRY BRIEFS

Bytex, CrossComm integrate products. Bytex Corp. and CrossComm Corp. last week announced they have signed an agreement to incorporate CrossComm's internetworking technology into Bytex's Maestro Intelligent Switching Hub.

CrossComm plans to build its next-generation router, which will feature fast packet capabilities, so that it can fit into one of Maestro's option slots. The CrossComm offering is scheduled for availability in the first half of next year.

Wellfleet, Prime team on service. Wellfleet Communications, Inc. last week announced an agreement with Prime Computer, Inc. under which Prime will provide on-site service for Wellfleet's internetworking products.

Under the three-year deal, Prime's PrimeService business unit will offer Wellfleet customers on-site parts and labor support for routers and bridges 24 hours a day, seven days a week.

GEIS announces X.400 links. GE Information Services (GEIS), a Rockville, Md., value-added network provider, last week announced X.400-based interconnections with IBM, Sprint International and BT North America, Inc.

The interconnection agreements allow GEIS QUIK-COMM System users to exchange electronic messages with users of the other vendors' value-added nets. GEIS previously had announced similar interconnection agreements with AT&T, AT&T EasyLink (formerly Western Union Corp.) and MCI Communications Corp.

Cellular bundling brouhaha

Industry players take sides on FCC proposal to lift restriction prohibiting bundling of cellular services with customer premises equipment at discounted prices.

For	Against
BellSouth Corp.	Cellnet Communications, Inc.
Cellular Telecommunications Industry Association	Cellular Marketing, Inc.
Centel Cellular Co.	Independent Data Communications Manufacturers Association, Inc.
GTE Mobilnet, Inc.	MCI Communications Corp.
Nynex Mobile Communications Co.	National Cellular Resellers Association
Southwestern Bell Mobile Systems	North American Telecommunications Association
Telocator	Tandy Corp.
United States Telephone Association	

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: *NETWORK WORLD*

Datacom firms blast FCC bundling plan

Equipment makers oppose cellular service and equipment bundling as dangerous precedent.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — Worried that a dangerous precedent will be set for other markets, data equipment manufacturers are voicing strong opposition to an FCC proposal that would lift the ban on bundling equipment and services in the cellular communications arena.

The combined sale of services and customer premises equipment at a discounted price, a practice known as bundling, has long been prohibited in the telecommunications market by the Federal Communications Commission. However, the FCC wants to allow bundling in the cellular marketplace and insists that any new pro-bundling rules would only apply to that arena.

The Independent Data Communications Manufacturers Association, Inc. (IDCMA), which has long considered bundling a threat to its members, contends that the change could ripple through the long-distance and emerging personal communications network (PCN) markets.

Most of the IDCMA's members don't even make cellular customer premises equipment. But the trade group's attorney, David Nall, said the IDCMA has entered the debate over cellular bundling because the outcome of the issue may influence another proceeding that would ease regulatory restrictions on AT&T, including the one for bundling.

Among other changes proposed in that proceeding, the FCC suggested that AT&T be allowed to bundle services and equipment under tariffs, a suggestion that drew fire from IBM and Digital Equipment Corp.

The North American Telecommunications Association (NATA), whose members are engaged in manufacturing cellular customer premises equipment, agreed that a dangerous precedent could be set for other markets. "If you do it for cellular, then you're doing it for everything," said NATA attorney Al Kramer.

Both the IDCMA and NATA contend that bundling policies will result in reduced innovation and diminished consumer choice.

The two organizations recently submitted comments to the FCC on the cellular issue, arguing that heavily discounted customer premises equipment and service packages will wipe out independent distribution channels.

"When you have an unbundled CPE market, you don't have to have a relationship with a carrier to get into the market," Nall said. "It's far more competitive."

According to Kramer, "PCN is another environment where [bundling] is potentially troublesome."

The cellular industry is on the verge of expanding to include the microcell-based PCN for both mobile voice communications and wireless, high-speed data local-area networks and private branch exchanges.

"You'll deny the promise of the future if you don't allow the competitive marketplace to remain," Nall said.

The prohibition on bundling has been widely ignored by cellular service providers for several

(continued on page 11)

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Datacom firms blast FCC plan

continued from page 9

years as the FCC has turned a blind eye to violations.

Nonetheless, cellular service providers have welcomed the FCC's move to change the rules (see chart, page 9).

In comments supporting bundling, the Cellular Telecommunications Industry Association emphasized that the industry still has the obligation to ensure that cellular service is always provided separately on nondiscriminatory terms.

The FCC last March tentatively concluded that the cellular market is highly competitive and bundling has led to its growth.

But bundling not only artificially inflates cellular service rates, according to the National Cellular Resellers Association (NCRA), it lures many customers attracted to discounted equipment into taking services they cannot afford.

The result is a startling drop-off in subscribers, the NCRA maintains.

"Customer churn at this level means that a carrier that begins a year with 100,000 subscribers loses approximately 40,000 of them within 12 months," NCRA said in its recent comments to the FCC.

Many critics ask how the cellular market, which the FCC structured as a duopoly within each service area, can be considered highly competitive.

The FCC now asserts that paging and wire line services compete with cellular.

But the IDCMA retorts that adoption of the FCC's "flawed logic" could lead to allowing AT&T or other wire line carriers to bundle customer premises equipment with transmission services. ◘

Timeplex meets new challenges

continued from page 9

the European mind-set, for example. Having a European partner gives balance to what is admittedly a U.S.-dominated view that we tend to have.

Some users and analysts have expressed concern that Timeplex will focus too many of its resources overseas and neglect its installed base in the U.S. How do you address that?

You have to have a strong U.S. business to be in the computer or communications business. Ascom is not going to just purchase a company, which is strong in the U.S., and then weaken it. I can't envision that occurring.

Will Ascom and Mercedes Information Technologies provide Timeplex with more financial resources than were available from Unisys?

There never was a problem of getting the resources to execute our annual financial plan [under Unisys]. But the profitability of the company was a dominant issue that we had to [see] to. The new owners are of a mind to do some investing in [Timeplex] as they move forward in order to achieve a leadership position in enterprise networking.

(Editor's note: The Ascom-Mercedes partnership has said it plans to reinvest Timeplex's profits back into the company for the next several years to accelerate R&D activities, a Timeplex spokesman said. Also, Ascom is doing its own R&D on broadband telecommunications technologies from which Timeplex may benefit.)

How do you think the sale of Timeplex will affect other players in the T-1 market?

The companies in our industry are at least half our size or smaller, and they all have their struggles for being one- or two- product companies. I could argue that there will be consolidation in the industry and that they'll all end up being bought one of these days — some of that is going to occur in the mid-90s.

There are too many companies in our [wide-area networking] industry, and some of them aren't doing well because they don't have the economies of scale. ◘

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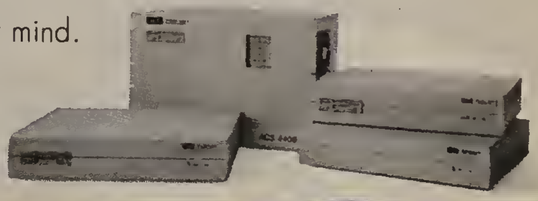

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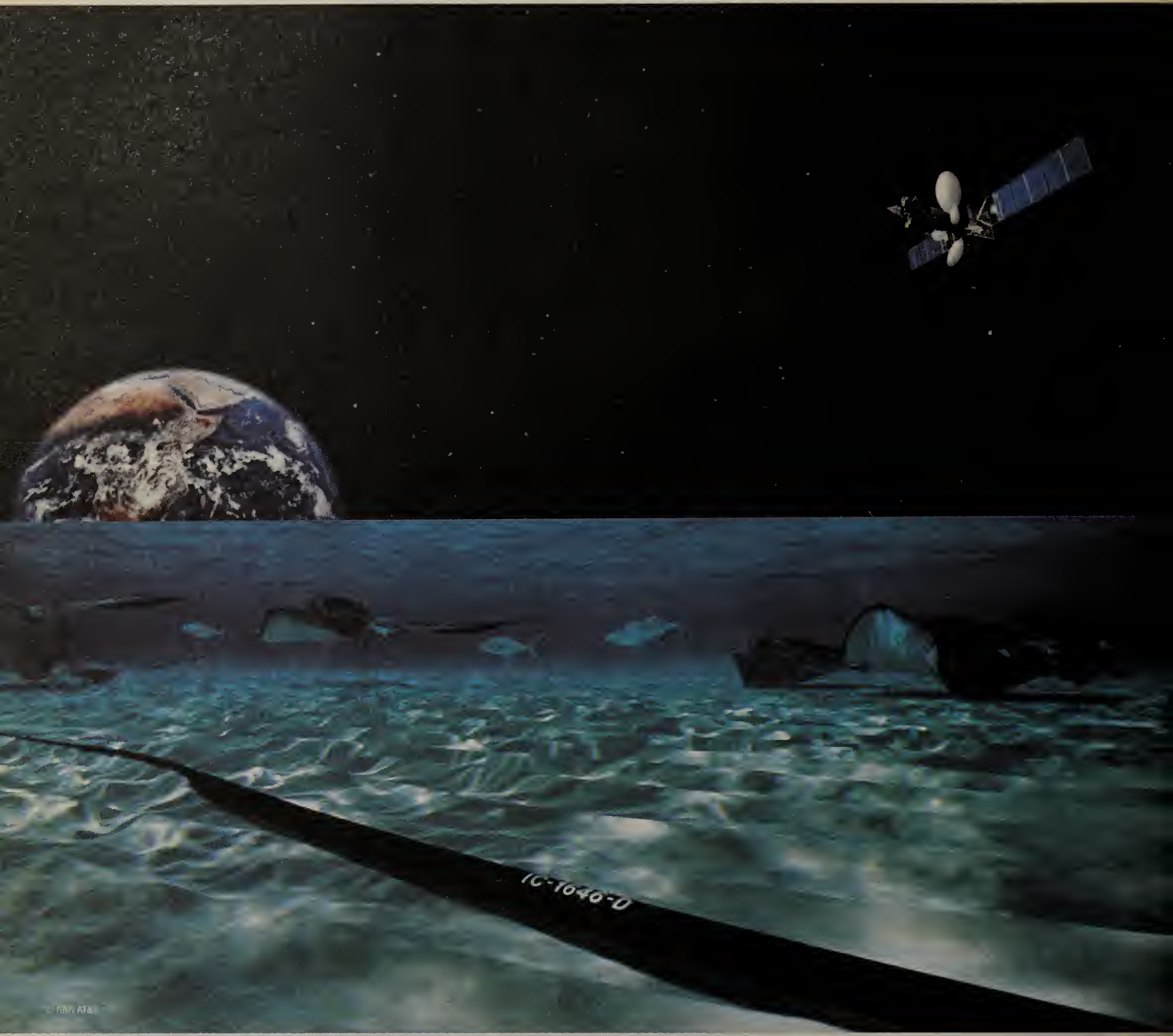

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TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

US Sprint Communications Co. last week announced a program for the American Legion under which members will receive a free hour of calling and have 5% of their monthly usage fee donated to American Legion programs.

Carrier Watch

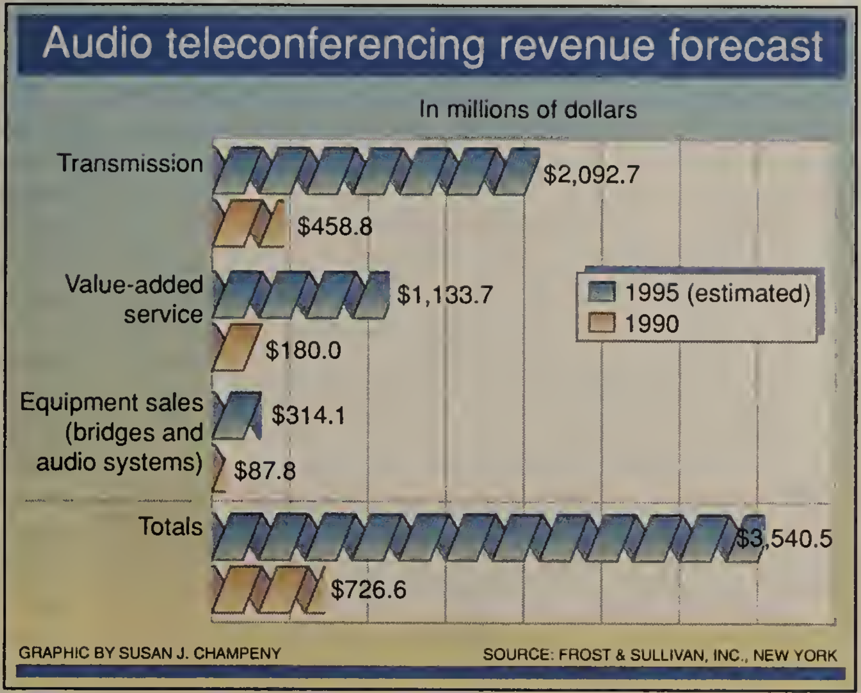
Metropolitan Fiber Systems, Inc. (MFS) of Oakbrook Terrace, Ill., recently began offering MetroFiber Interconnection Services to users served by its fiber network in New York.

The first service, dubbed MetroFiber C.O.nnection, links users to New York Telephone Co. central offices via fiber, giving them direct access to the Bell operating company's switched and dedicated services. MetroFiber C.O.nnection also offers backup electronics and power. The second service, MetroFiber C.O.Link, links New York Telephone customers outside the MFS service area to the MFS net.

In his address at the recent Securities Industry Association's Information Management Conference and Exhibit, William Esrey, chairman and chief executive officer of **United Telecommunications, Inc.** and its subsidiary, **US Sprint Communications Co.**, took an unusual approach to the conference theme, "Information Systems — Strategic Asset or Commodity?"

Esrey argued that early subscribers to new technologies gain an edge until usage spreads and the advantage disappears. He said the fiber net initially gave US Sprint an advantage but this edge is diminishing and US Sprint will have to focus on services for competitive advantage.

Audio teleconferencing revenue forecast



GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: FROST & SULLIVAN, INC., NEW YORK

MCI, WilTel protest revised Tariff 12 net arrangement

AT&T to cut Bridgestone/Firestone annual fee.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Despite protests from rival carriers, the Federal Communications Commission last week allowed AT&T to proceed with plans to reduce the minimum annual charges for Bridgestone/Firestone, Inc.'s Tariff 12 deal by 61%.

In late April, AT&T informed the FCC that Bridgestone/Firestone was having severe business difficulties and could no longer make its guaranteed minimum usage payments. AT&T proposed slashing those charges from $6.45 million to $2.5 million annually ("Rate cut for ailing user fuels Tariff 12 questions," *NW*, April 22).

> "Tariff 12 customers' commitments are eminently mutable."
>
> ▲▲▲

Rival vendors MCI Communications Corp. and WilTel both criticized the revision of the deal, contending that such a major change undermines the original characterization of Tariff 12 that AT&T gave regulators and the courts in its quest to have the deal approved.

When AT&T first proposed these deals, it said one of the reasons it was able to offer Tariff 12 users discounted rates was due to the commitment they made under the fixed-rate, fixed-term arrangements.

"AT&T shows here [with the Bridgestone/Firestone revision] that Tariff 12 customers' commitments are eminently mutable and, therefore, represent no real commitments at all," stated a letter from MCI to the FCC's general counsel.

AT&T had told an appeals court during the legal wrangling over Tariff 12 that, "contrary to [opponents'] assertions, the minimum annual commitments have in fact been immutable in practice."

After reviewing the objections to the Bridgestone/Firestone Tariff 12 revision, the FCC issued its usual one-line denial of tariff protests and allowed the revised deal to take effect.

"We conclude that no compelling argument has been presented that the tariff revisions are so patently unlawful as to warrant rejection," the FCC stated in its order.

AT&T had justified the revision to the commission by arguing that, in return for greatly reduced minimum annual charges, Bridgestone/Firestone agreed to higher prices and other conditions. AT&T will make about $60,000 in additional revenue on the revised deal.

Because AT&T is the dominant long-distance carrier, the Communications Act of 1934 mandates that it must offer service with comparable terms and conditions to all who request it.

AT&T filed its first commercial Tariff 12 deal in 1987, naming General Electric Co. as the only customer. The carrier was later forced by the FCC to remove

(continued on page 70)

1991 expected to be crucial year for ISDN

Bellcore's National ISDN 1 push will likely hasten availability and implementation of the technology.

By Bob Wallace
Senior Editor

Fueled by Bell Communications Research's efforts to get separate industry segments to cooperate on Integrated Services Digital Network, 1991 will likely be regarded as a watershed year for ISDN.

Expected to spark new interest in the technology is Bellcore's National ISDN 1, coupled with the release of products such as IBM's Basic Rate Interface (BRI) for terminal controllers and unique new products built to take advantage of ISDN signaling.

The industry has already voiced wide support for National ISDN 1, which is expected to spur development of affordable station equipment and bring on terminal portability.

"National ISDN 1 is an important milestone in that it has rejuvenated hope for the Basic Rate Interface," said Ian Angus, president of Angus TeleManagement Group, a consultancy in Pickering, Ontario, that specializes in ISDN and intelligent networks. "The absence of common agreements on how to [support] BRI kept equipment costs high and deployment slow."

National ISDN 1 is a set of Bellcore technical references that define how customer premises equipment accesses central office ISDN switches and how different vendors' switches interoperate using Common Channel Signaling System 7.

It is hoped that support for National ISDN 1 will accelerate deployment of ISDN, spur equipment development by a larger group of vendors and boost use of the technology. A wider selection of interoperable ISDN equipment will give users more options in planning for and implementing the technology.

"I honestly believe National ISDN 1 will hasten the availability of ISDN," said Edward Hodgson, computer and communications manager for Schindler Elevator Co. in Morristown, N.J. "[The regional Bell holding companies'] deployment plans are now much more aggressive."

National ISDN 1 is also expected to make life easier for equipment vendors.

"National ISDN 1 is the first major step away from vendor-specific ISDN implementations and toward a single implementa-

(continued on page 14)

WASHINGTON UPDATE

BY ANITA TAFF

MCI to bait tariff with videoconferencing. MCI Communications Corp. last week expanded its efforts to lure government users off the Federal Telecommunications System (FTS) 2000 network with a new videoconferencing service it says costs one-third of the price those users now pay. MCI announced a deal with PictureTel Corp., a videoconferencing equipment provider in Peabody, Mass., that will enable the carrier to provide government users with videoconferencing services at about $100 an hour, compared to FTS 2000 rates of about $300 an hour, according to company officials.

US Sprint Communications Co. and AT&T beat out MCI in the 1988 bidding for the 10-year FTS 2000 contract to upgrade the aging federal net. Although the FTS 2000 contract was envisioned to cover virtually all federal agencies, MCI has attempted to lure users away with a special tariff filed in February that it says undercuts FTS 2000 prices by 40%.

On July 1, MCI will add videoconferencing capabilities to that tariff, which initially included private lines, outbound virtual private net voice services and toll-free 800 services. Unlike the FTS 2000 service, MCI's videoconferencing service will provide transmission services and equipment. AT&T and US Sprint have said they will help government users coordinate purchases of videoconferencing equipment from Compression Labs, Inc., but FTS 2000 does not include equipment in the contract.

1991 expected to be crucial year for ISDN

continued from page 13

tion agreement," said Richard Aloia, Bellcore's assistant vice-president of network access technology. "This is a signal to terminal equipment vendors to get going."

National ISDN 1 got a shot in the arm in March when AT&T Network Systems Group, Northern Telecom, Inc. and Siemens Stromberg-Carlson announced that switch software supporting National ISDN 1 will be ready for testing by phone companies in December and generally available in 1992.

And customer premises equipment vendors are starting to do their part to roll out ISDN products. "I think National ISDN 1 will show equipment vendors that there is another viable market out there that they can cash in on," Hodgson said.

IBM is banking on the ISDN equipment market. Its announcement of ISDN products earlier this year is seen by industry observers as an important event in the development of the ISDN movement.

In January, IBM introduced an ISDN BRI for its 3174 cluster controller, its first ISDN interface for a terminal controller. The 3174 ISDN BRI Adapter, used with existing ISDN interfaces for IBM Personal System/2 microcomputers, enables remote users to dial into hosts at high speeds.

The IBM ISDN products work with the industry's two most popular ISDN-compatible central office switches, AT&T's 5ESS and Northern Telecom's DMS-100.

"IBM having a BRI available for its [main] controller legitimizes ISDN for an enormous number of IBM users who previously thought ISDN had nothing to do with them," said Angus. "It raises the question of ISDN for these users, and that's quite important."

'Active' ISDN applications

While ISDN interfaces for terminal controllers may go a long way to increase use of ISDN, unique products that can use ISDN signaling to interact with the public-switched network may do more, analysts said.

In May, Unifi Communications Corp. of Billerica, Mass., announced products that enable users to build call distribution systems based on public ISDN services, obviating the need for automatic call distributors or private branch exchanges configured as such.

The Unifi product, called PhoneServer, includes a software component that runs on an on-site workstation configured as a controller and enables users to instruct the public network to route calls to local or remote agents as well as to people working at home.

The controller exchanges call routing information with an ISDN central office switch over the D signaling channel of a BRI line. The switch serving the controller uses the ISDN Q.931 protocol to notify the controller about incoming calls. The controller then determines where the call should be sent and issues a D-channel message, invoking an ISDN supplementary service that tells the switch to reroute the call to another location.

Angus said PhoneServer is an active ISDN application in contrast to most others that have been passive.

"Most ISDN applications have been passive in that they use the D channel as a one-way channel over which they receive information that is then acted on in some fashion," Angus said. "With the Unifi product, you can send information to the network that tells it how to route calls."

Angus predicted that the industry will look back on the PhoneServer announcement and see it as a major milestone in the development of ISDN.

Users also hailed the announcement of PhoneServer as an event of importance to the ISDN movement. "This product will help give ISDN reason for being," said Tom Fermazin, Amoco Corp.'s senior technology analyst. "Vendor and users will point to the PhoneServer and say, 'Here's what ISDN can do.' "

Stepped-up deployment

While several key ISDN products were launched early on, the first six months of this year also saw accelerated ISDN deployment commitments from most regional Bell holding companies.

In mid-April, Bellcore detailed how the RBHCs have changed their ISDN deployment plans due to the release of the Bellcore National ISDN 1 specification. The first RBHC plans announced since the release of the specification show most are planning to support ISDN on far more switches by the end of 1994 than was projected as recently as last year.

For example, in a February 1990 filing with the Federal Communications Commission, Ameritech said it would have 153 ISDN-ready central offices by 1994, but revised that figure to 597. US West, Inc. did the same, boosting the predictions for the number of ISDN central offices it would have in place by year-end 1994 from 121 to 230.

"The RBHCs don't seem to be dragging their feet anymore on ISDN deployment," Hodgson said. "I'm pleased to see that many have made their rollout schedules more aggressive since National ISDN 1 was announced."

But despite the enthusiasm surrounding the National ISDN 1 effort, some analysts, like Angus, are only cautiously optimistic. "We've had our hopes dashed several times by carriers and vendors, so there is a certain tendency to say we'll wait and see." ☒

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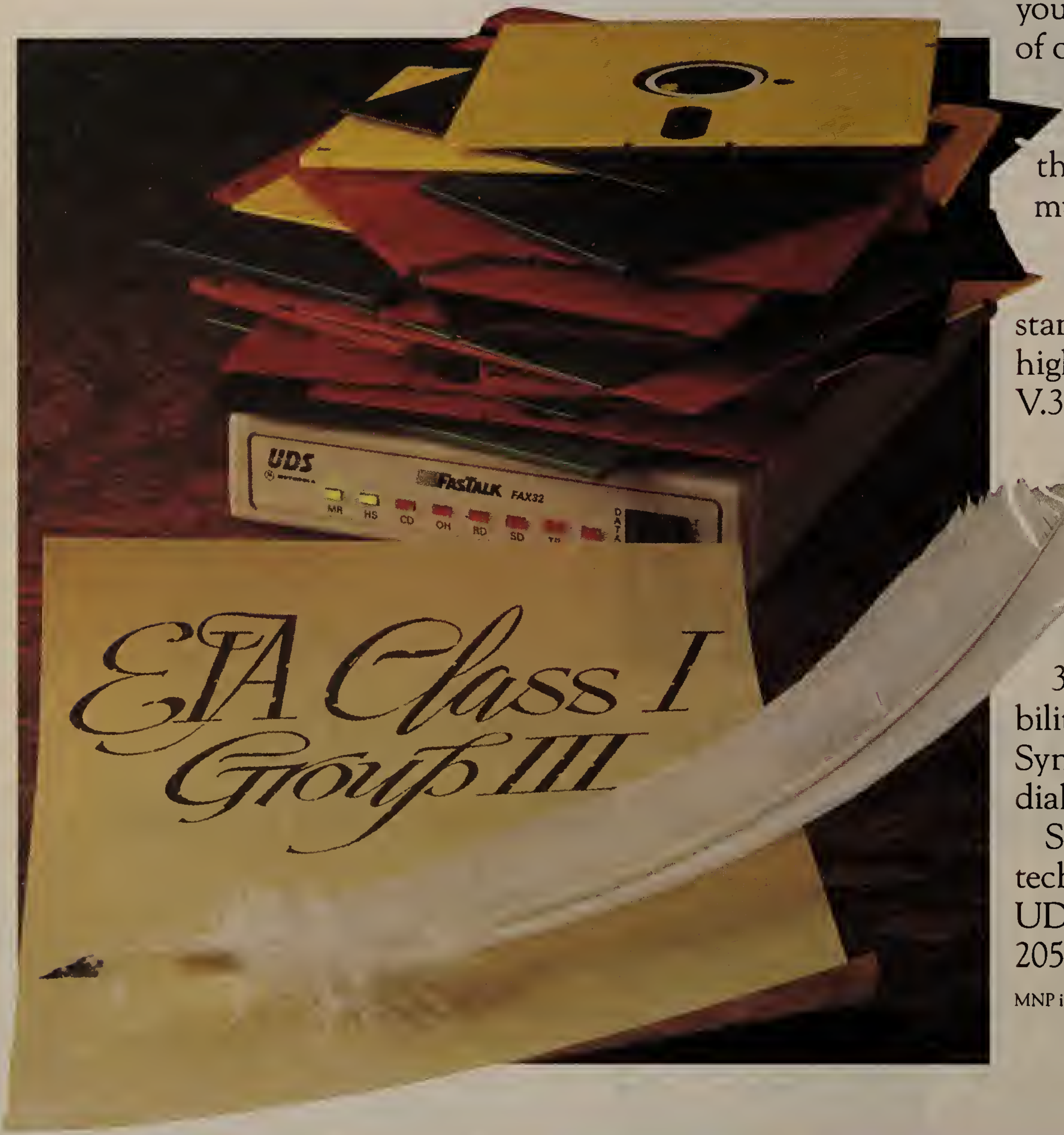

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Ellen Hancock
IBM vice-president
and general manager
Networking Systems

Data Packets

Bliss Communications of Wall, N.J., will announce at PC Expo this week a new message handling system that lets users broadcast messages that can be received by personal computers, facsimile machines, printers and other devices. The BlissComm Model 020 is an asynchronous communications computer to which locally attached or dial-up users can send messages. The Model 020 then performs the protocol conversion necessary to send it to numerous types of recipient devices.

Pricing for the Model 020 starts at $6,800.

Network Software Associates, Inc. (NSA) of Laguna Hills, Calif., recently announced a new IBM 3270 Distributed Function Terminal emulation package for DOS-based, IBM or compatible personal computers that occupies only 77K bytes of random-access memory for a single LU 2 session. The new 3270/ElitePlus lets personal computers emulate IBM 3278 or 3279 display stations and an IBM 3287 printer. As many as five concurrent logical unit sessions are supported.

Available now, the single-quantity price for the 3270/ElitePlus is $395. A network license version for use with NSA's AdaptSNA LAN Gateway costs $1,295. ☒

MasterCard widens use of Clearview T-1 net monitor

Helps company negotiate rebates from carriers.

By Jim Brown
Senior Editor

ST. LOUIS — MasterCard International, Inc. said last week it has expanded use of a T-1 circuit monitoring tool that quickly identifies circuit problems and helps the company win rebates from carriers when circuit performance falls below guaranteed levels.

MasterCard utilizes a Sun Microsystems, Inc. SPARCstation running Clear Communications Corp.'s Clearview Surveillance System software to monitor all 119 T-1 circuits in its Banknet network, which shuttles credit card authorization data between merchants and banks. That number is up from the 80 circuits that MasterCard first began monitoring when the Clearview software was installed last November.

The Clearview software and central site workstation enable MasterCard to collect the T-1 extended superframe (ESF) network management data every 30 minutes from a Larse Corp. data service unit/channel service unit (DSU/CSU) attached to each T-1 line. The ESF data is returned to the Sun workstation via a 9.6K bit/sec channel on the T-1 network.

The Clearview software uses the ESF data to determine if the circuit performance has fallen below guaranteed levels. This feature enables MasterCard to gather the data needed to demand a rebate — and its carriers have been listening.

"We've reviewed this product with all our carriers," said Ron Thornhill, vice-president of network services at MasterCard. "They are not doubting its findings. When we call in to report problems, carriers know we're right."

MasterCard would not say how many rebates it has received since installing Clearview but acknowledged that it has obtained refunds in a number of cases.

(continued on page 70)

NCR, Unicorn join forces in distributed OLTP effort

By Paul Desmond
Senior Editor

DAYTON, Ohio — NCR Corp. and Unicorn Systems Co. recently announced they are jointly developing software that will let users run IBM CICS-based on-line transaction processing (OLTP) applications in a distributed fashion on Unix machines.

The software will be an interface that will enable Unicorn System's UniKix product to work with NCR's Top End transaction processing monitor for Unix systems. UniKix allows users to develop and execute CICS applications on Unix machines.

Interoperability between UniKix and Top End may let users offload OLTP applications from mainframes to a less expensive configuration of networked Unix machines. "This allows IBM [users] to move to open systems architectures under Unix and not give up their investment in CICS applications," said Michael Scroggin, president of Unicorn Systems in Glendale, Calif.

Top End runs under Unix System V.3 on NCR's System 3000 line and is built around X/Open Company, Ltd.'s Distributed Transaction Processing model.

The product manages the process by which client applications access and update data from Unix servers running data base management system software from a number of vendors ("NCR tool helps users build OLTP applications for Unix," *NW,* Jan. 14). It works over Transmission Control Protocol/Internet Protocol or X.25 networks, said Jim Fischer, product manager for Top End at NCR, based here.

The software will consist of a series of interfaces that will let UniKix function as a CICS server under Top End and as a client that can use Top End services. A directory service within Top End routes messages to the appropriate node, depending on the service requested, Fischer said.

To help gradually migrate applications off a host, users will be able to run some CICS applications on Unix machines and others on IBM hosts, though a Systems Network Architecture gateway would be required.

Top End is currently installed at beta sites, and UniKix is generally available. The interface software is scheduled for availability in the third quarter. Pricing has not been set. ☒

Nissan Motor Corp. headquarters in Carson, Calif.

Nissan layers new applications on net

Automaker builds on packet net to give buyers faster credit approval, offer new tools for dealers.

By Paul Desmond
Senior Editor

CARSON, Calif. — In an effort to improve sales and customer service, Nissan Motor Corp. in USA is rolling out a bevy of new applications over its dealer network, including one that will let customers secure credit while they're in the showroom.

Nissan wants to make better use of the data stored on its mainframes by giving dealers easier access to it through the network, as well as providing them with applications designed to manipulate the information.

Today, about 700 of the 1,100 Nissan dealers in the U.S. are linked to the data center here via dial-up, 1,200 bit/sec lines, said Tony Lucente, manager of dealer services in Nissan's information services department. By July 1, they are scheduled to be converted to BT North America, Inc.'s Tymnet public packet net, which already serves the other 400 dealers.

Using Tymnet will give dealers far more flexibility in how they communicate with the corporate data center. With the dial-up lines, Nissan's Digital Equipment Corp. computers poll processors in the dealerships once a day to pick up and drop off reports.

That requires a dealer's computer system to be in unattended mode at 5 p.m., ready to receive the poll. The poll is tried three times and, if it is unsuccessful, the dealer cannot send or pick up files. That may mean, for example, that a parts order could be delayed a day, which ultimately hurts customer service.

Dealerships on the Tymnet network communicate at 2,400 bit/sec directly with the IBM 3090 500S mainframe supporting the company's primary business applications. Those dealers can communicate with the host at any time during the day.

Nissan is also rolling out new applications that take advantage of the improved communications flexibility, including one that speeds the process of approving loans through Nissan Motor Acceptance Corp. (NMAC).

Today, loan applications are submitted over the phone or sent via facsimile to NMAC, then keyed into the host by data entry clerks.

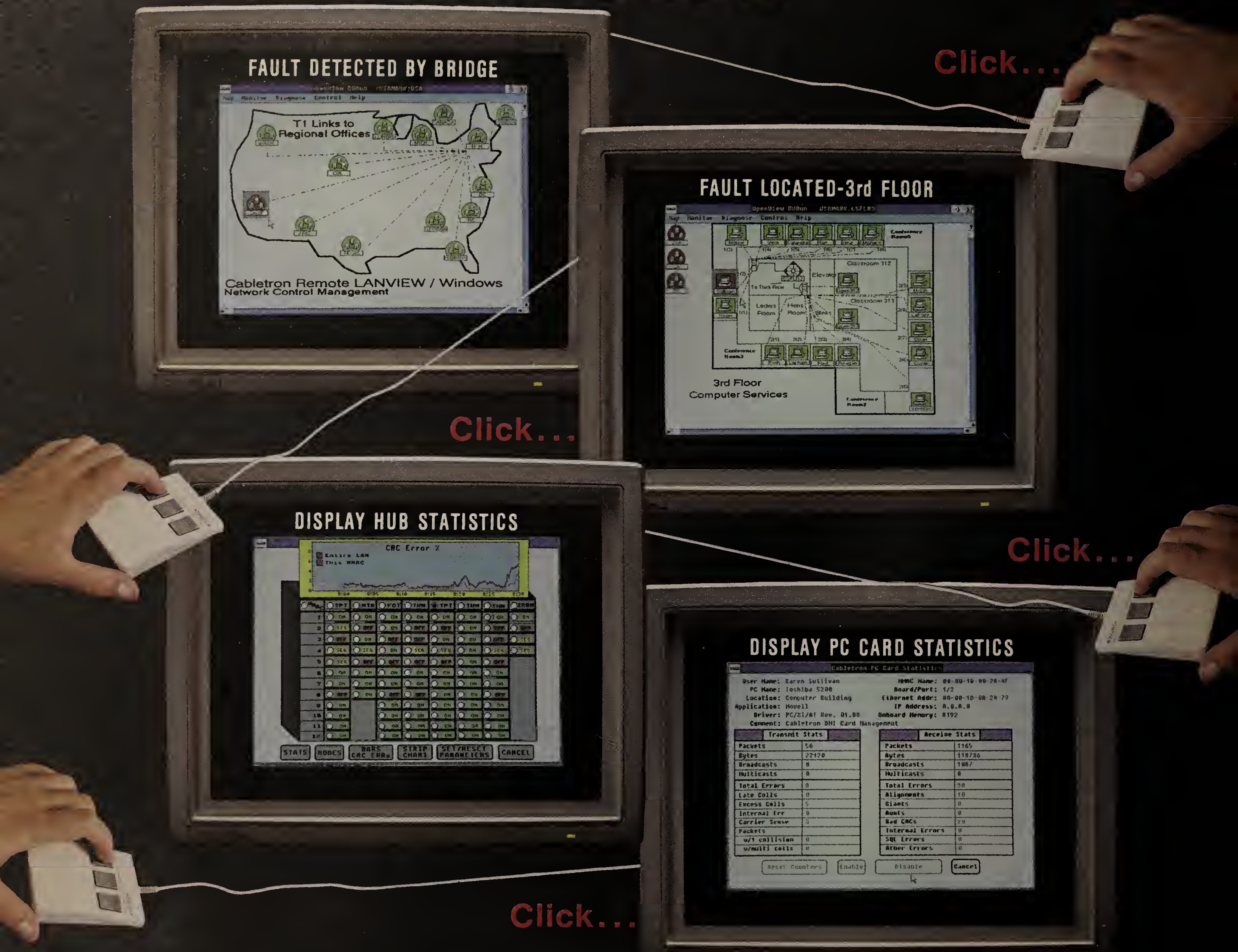
> Users in the dealership transmit data to the host-based NMAC credit application.
>
> ▲▲▲

Applications are then checked by loan processing clerks, who must also initiate a request to one of the three major U.S. credit bureaus for a credit history on the customer before approving a loan. At best, that process takes hours, and loans cannot be approved on weekends.

With the new system, which is currently being tested at the company's headquarters, users in the dealership key in the credit information and, when done, transmit it to the host-based NMAC credit application. The mainframe automatically initiates a request for a credit report, which it receives via a leased-line connection from

(continued on page 70)

10BASE-T NETWORK MANAGEMENT MADE EASY.



Cabletron PC Card Statistics

User Name: Karen Sullivan
PC Name: Toshiba 5200
Location: Computer Building
Application: Novell
Driver: PC/XI/AT Rev. 01.00
Comment: Cabletron DNI Card Management
MMAC Name: 00-00-1D-00-28-4F
Board/Port: 1/2
Ethernet Addr: 00-00-1D-0A-24-79
IP Address: 0.0.0.0
Onboard Memory: 8192

Transmit Stats	
Packets	56
Bytes	22120
Broadcasts	0
Multicasts	0
Total Errors	0
Late Colls	0
Excess Colls	5
Internal Err	0
Carrier Sense	5
Packets	
w/1 collision	0
w/multi colls	0

Receive Stats	
Packets	1165
Bytes	119736
Broadcasts	1087
Multicasts	0
Total Errors	30
Alignments	10
Giants	0
Runts	0
Bad CRCs	20
Internal Errors	0
SQE Errors	0
Other Errors	0

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Worth Noting

> "I'd be so excited about token-ring connectivity to the DEC environment that I'd be able to overlook a lapse in time to have [Local Area Transport over token ring.]"
>
> **Sholom Bryski**
> Vice-president
> Bankers Trust
> New York

Netnotes

Cayman Systems, Inc. has released a line of Ethernet adapter cards for most of the Macintosh computers Apple Computer, Inc. offers. The GatorCard line supports 10-BaseT twisted pair as well as standard and thin Ethernet coaxial cable for Macintosh II, SE and SE/30 computers.

The sixteen 32-bit cards in the GatorCard line offer direct memory access. The GatorCards are available now and cost $449. With an optional Motorola, Inc. 68882 math coprocessor, the cards cost $599.

Datability, Inc. and **BICC Communications** have announced an agreement under which the firms will develop a terminal server module for BICC's net concentrator.

The module will be based on Datability's VCP-300 sixteen-port terminal server and will operate in BICC's Etherconnect System Ethernet hub. The VCP-300 supports the Transmission Control Protocol/Internet Protocol and Digital Equipment Corp. Local Area Transport protocols for terminal-to-host communications.

Palindrome Corp. last week released the latest version of its local-area network backup software, Network Archivist Version 2.0, which includes support for Novell, Inc.'s Name Services, Apple Computer, Inc.'s 31-character Macintosh file names, media diagnostics and the flagging of files that were possibly written to, during or after backup.

Chipcom adds Cisco router to its intelligent wiring hub

Hubs can be outfitted with up to 3 router modules.

By Eric Smalley
Senior Editor

SOUTHBOROUGH, Mass. — Chipcom Corp. last week introduced an integrated Ethernet router, based on technology from Cisco Systems, Inc., for its Online System Concentrator net hub.

The Online Ethernet Router Module, available in local- and wide-area versions, is the result of an agreement signed last year between Chipcom and Cisco.

The Online hub can be configured to support as many as three separate Ethernet, token-ring and Fiber Distributed Data Interface networks. When outfitted to support more than one Ethernet, the integral router can be used to direct packets between individual subnets.

Net managers can configure Online hubs with as many as three router modules, creating multiple links between networks within a concentrator or between two or more concentrators.

The router module, available with serial, X.25 and frame relay interfaces, provides the first wide-area network links for Chipcom's concentrator, according to company officials.

The Online Ethernet Router Module supports Cisco's multiprotocol routing and transparent bridging. Protocols supported include Apple Computer, Inc.'s AppleTalk Phase I and II, Banyan Systems, Inc.'s VINES, Digital Equipment Corp.'s DECnet Phase IV, Novell, Inc.'s Internet Packet Exchange (IPX), the Spanning Tree Protocol, the Transmission Control Protocol/Internet Protocol and Xerox Corp.'s Xerox Network Systems.

Based on a 16-MHz, 32-bit Motorola, Inc. 68020 processor, the module has 1M byte of memory.

An Ethernet-to-Ethernet version of the Online router is to be available in August for $6,350. An Ethernet-to-serial line version should also be available at that time for $6,850. A version supporting X.25 and frame relay is scheduled to be available in September for $7,150.

Simulation option added to FDDI network analyzer

By Caryn Gillooly
Senior Editor

CALABASAS, Calif. — Tekelec, Inc. last week announced a Fiber Distributed Data Interface simulation option for its existing ChameLAN 100 FDDI network analyzer. The new feature will let administrators simulate FDDI traffic while continuing to use the device as a net monitor.

The simulation option consists of both hardware and software for the ChameLAN 100.

According to Robert Hess, vice-president and director of corporate marketing at Tekelec, the ChameLAN 100 simulation option emulates specific FDDI traffic patterns and conditions.

For example, the option lets users specify frame information, sequence of frames and rate of transmission, and even inject errors into the network or generate misformed frames to determine how the network will react.

"It is important to emulate network conditions because a device that operates smoothly in an isolated environment may have problems when connected to a large net," said Yigal Jacoby, product manager for local-area network, FDDI and Open Systems Interconnection products.

The ChameLAN 100 offers preprogrammed tests, such as link error monitor tests and claim token process tests, the latter of which make sure the token claiming process is working correctly.

The product comes with a full set of C library functions to let users customize their own tests.

> The simulation option consists of both hardware and software for the ChameLAN 100.

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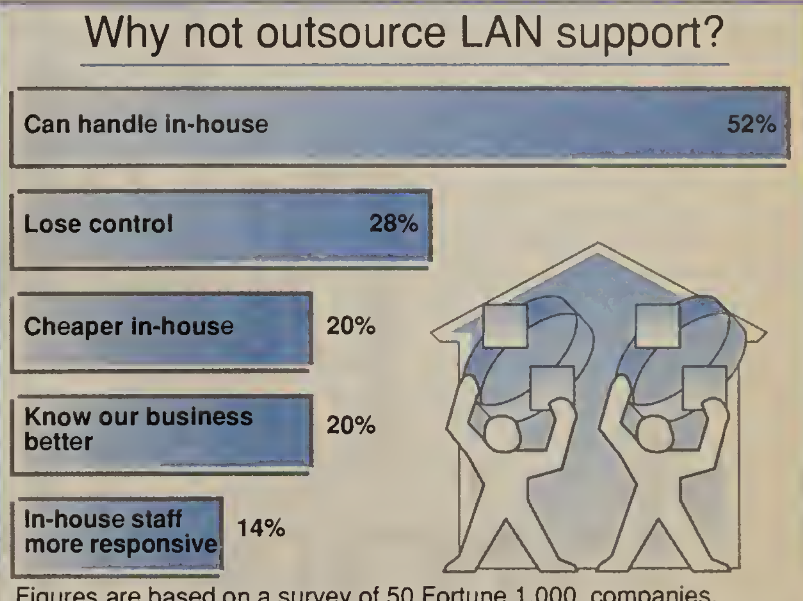
The ChameLAN 100 also includes a Ring Map feature, which displays network and ring configuration information graphically.

The FDDI simulation option for the ChameLAN 100 is to be available in August for $7,500. The ChameLAN 100, available now, starts at $37,500.



Figures are based on a survey of 50 Fortune 1,000 companies. More than 1 response was allowed.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

Firms retain control of LAN management

Study shows that few large companies are opting to outsource control of their strategic LAN assets.

By Caryn Gillooly
Senior Editor

CAMBRIDGE, Mass. — Despite the net management demands associated with the proliferation of local-area networks, most large companies are still tackling the problem using in-house experts instead of outsourcing LAN management, according to a study by Forrester Research, Inc.

Forrester Research stated that, in contradiction to what vendors are saying, corporate users are finding it not only easier, but more cost-effective to manage their LANs instead of farming out the task to third parties. The research firm drew its conclusions from interviews with 50 Fortune 1,000 corporations.

The companies interviewed in the study, on average, are planning to more than double their number of business locations with LANs, growing from a current average of 26 sites to 61 sites in two years.

Forrester Research contends that vendors are gearing up to provide support for these systems on the assumption that users cannot handle the load alone. Vendors claim that LANs are too complex to manage in-house, particularly with increased internetworking, and that regardless of what may appear to be lower costs, users are spending more than they realize on support.

Users, however, are proving vendors wrong.

"We've had practically no problems so far," said one industrial equipment company interviewed for the study. "We do things in-house for basically two reasons: It costs less, and it's fairly easy to do."

Other respondents agreed. "There are a lot of vendors always knocking on our door to sell us services," said a user at a pharmaceutical company interviewed but not named in the survey. "We'd just prefer to do it ourselves."

According to Janet Hyland, director of network strategy research at Forrester Research, the study results were surprising.

"We'd been hearing from the vendors that Fortune 1,000 companies were pulling their hair out trying to figure out how to deal with their LANs," she said. "But when we talked to users, they said it really wasn't a big deal and that there wasn't anything particularly thorny about it."

Corporate rationale

The primary reasons users chose not to outsource were to maintain ease of management and to control both the networks and information found on them (see chart, this page).

Hyland said many companies simply would not trust their networks to outside sources. "Many of our LAN applications are mission-critical. We want to maintain control," said a representative of a commercial bank interviewed for the study.

Other users said they trusted outside sources with the proprietary company information on the networks but thought they could respond faster to outages than a service provider could, according to the study.

Still other users said the price

(continued on page 70)

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MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

Worth Noting

"Network managers are trying to become more multinational, but it's like taking on a second career."

Glenn Miller
Manager of telecommunications strategic planning
The Upjohn Co.
Kalamazoo, Mich.

Association Watch

The **Association of College and University Telecommunications Administrators (ACUTA)** will hold its 20th annual conference July 7-11 at the Adam's Mark Hotel in St. Louis.

Anne Jones, a former FCC commissioner who sits on Motorola, Inc.'s board of directors, will deliver the keynote address. Her speech will provide an insider's look into how the Federal Communications Commission decides issues of concern to net managers. She will also discuss potential changes in regulations affecting AT&T (including Tariff 12), the regulation of local exchange carriers and the continuing development of large nationwide private-line nets.

The conference will also feature a panel that will address private branch exchange fraud and steps users can take to combat the problem. The cost is $450 for members and $575 for nonmembers.

For more information, call ACUTA at (606) 252-2882.

InfoText Publishing Inc. will hold its first annual Interactive Telephone in Media and Marketing conference Sept. 24-25 at the Marriott Marquis Hotel in New York.

The conference will include sessions on building audience participation and response via interactive telephone services (800 and 900 numbers). The cost is $395 for one day, $595 for both days and $50 for attending the exhibit hall only. For more information, call InfoText at (714) 493-2434.

"A truly integrated team requires significant process reengineering and reorganization, and the people involved – all with vested interests – feel threatened by organizational change."

Mary Johnston-Turner
Principal
Northeast Consulting Resources, Inc.
Boston

Users not reaping benefits of integrated voice, data

Cost and political differences main obstacles.

By Maureen Molloy
Staff Writer

While many companies claim to have merged their voice and data network operations, the two functions still remain distinct and operate independently in most organizations — a problem that prevents users from realizing the benefits of true voice/data integration.

According to Mary Johnston-Turner, a principal at Northeast Consulting Resources, Inc., a consulting collaborative in Boston, fewer than 10% of all U.S. companies have fully integrated their voice and data departments.

"Users install a T-1 network or combine voice and data at the procurement level, and then call themselves integrated, but it's not real integration," Johnston-Turner said. "An organization must integrate voice and data shops at the network management, strategic planning and applications development levels before they can reap the benefits of true integration."

Making the transition to an integrated net operation is fraught with what some users view as insurmountable obstacles, including a lengthy and often expensive reorganization process as well as political turf issues.

"A truly integrated team requires significant process reengineering and reorganization, and the people involved — all with vested interests — feel threatened by organizational change," said Johnston-Turner. "Cost is another deterrent because it's not cheap to revamp an organization and retrain staff. Even when users know an integrated platform will save them money in the long term, many just haven't been ready to bite the bullet."

Users that have made the successful migration said mending political differences is the thorniest issue to overcome.

"Battling turf wars was by far the most difficult problem because, during any reorganization, someone gains something and another, by definition, loses something," said Trav Waltrip, vice-president of telecommunications at The Travelers Corp. in Hartford, Conn.

Waltrip said top management must understand and support the reorganization effort in order for it to succeed.

"If you establish the correct political environment, you're halfway there. But you also need to hire — if you don't already have one — a person who's been trained to think of voice and data as a single ubiquitous network," he said. "Once you have those two elements, everything else is manageable."

Tom Gmitter, director of information services at Rogers Group, Inc. in Nashville, is tackling the issue of integration. Although the company's voice and data departments are both housed under the information systems umbrella, there is now little communication between the two, he said.

"We recognize there are inherent benefits to integrating both, but we also recognize that we lack the expertise to do it," he said. "With some help from outside consultants, we hope to bring the two groups together over the next six months."

Those who overcome the obstacles claim that the unification effort pays off handsomely. The primary advantages of restructuring voice and data into a single unit include reduced overhead, improved strategic network planning, greater network efficiency at a lower cost and better service to corporate end users.

Gerard Monday, manager of corporate systems services at retail giant J.C. Penney Company,

(continued on page 23)

Suppliers judged on quality and service

Xerox, others find that longer term relationships with vendors lead to standardization, cost savings.

By Wayne Eckerson
Senior Editor

Like many companies, Xerox Corp. once selected network services and products largely on the basis of price and did not hesitate to switch vendors when those prices changed even slightly.

"We used to chase prices and change from one vendor to another on a monthly basis," said Fred Bolton, manager of telecommunications services at Xerox in Webster, N.Y. "At one point, we were using every terrestrial and satellite supplier of voice services there was."

Today, Xerox carefully selects suppliers that have the best track record for quality and service for each type of equipment or network function it needs. It then negotiates prices and works diligently with suppliers to ensure they continue to offer the highest quality products and services at the lowest cost.

This new approach has paid off for the office equipment manufacturer. "In every instance, we've come out ahead in terms of price, product quality, and service and support," Bolton said.

With networks becoming increasingly complex and the growing emphasis on quality and cost containment, network managers at many large companies have recognized the value of establishing longer term relationships with selected suppliers.

Identifying preferred suppliers enables companies to become more cost-effective by standardizing products and services.

Xerox, for example, currently buys all of its private branch exchanges from AT&T and its key systems from Northern Telecom, Inc.

With more than 150 major offices nationwide, Xerox not only negotiates sizable volume discounts with these suppliers, but can easily move systems from one location to another or swap parts as needed.

Sometimes suppliers offer the requisite quality but fall short in price, Bolton said. In those cases, Xerox will work with the vendor to obtain a more competitive price.

"If [securing competitive prices] means writing a longer term contract or aggregating a number of different purchases, we'll work out a strategy," Bolton said. "But sometimes, it's a matter of getting them to focus on their competition and the benefits of a long-term relationship with us, instead of just the sale."

Limiting the number of suppli-

(continued on page 23)

EXECUTIVE BRIEFS

BY WAYNE ECKERSON

IS training booms. The increasing complexity of information technology and the growing shortage of skilled workers will be a boon for providers of technical training services.

According to a recent report by Ledgeway/Dataquest, a market research firm in Lexington, Mass., the worldwide education and training market for information systems is growing at an annual rate of 15.7% and will reach $4.2 billion by 1995. U.S. companies alone doled out $1.4 billion for training in 1990, and that amount is expected to double by 1995. The report, titled "Education and Training: Market Analysis Outlook," further states that information service managers spend as much as $4 billion annually on internal education and training programs.

Besides market data, the report provides a detailed description of the education and training programs offered by major vendors, including Digital Equipment Corp., Hewlett-Packard Co. and IBM.

The 190-page report costs $2,250 and can be obtained by calling Ledgeway/Dataquest at (617) 862-8500.

(continued on page 23)

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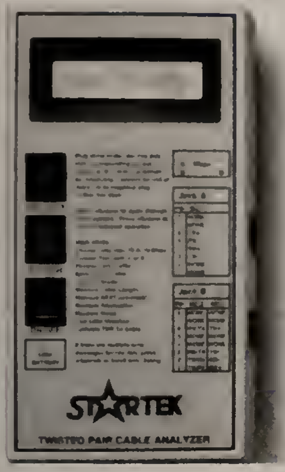

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Suppliers judged on quality and service

continued from page 21

ers also reduces such administrative expenses as checking the accuracy of vendor bills and managing vendor contracts. It also eliminates the hassles of getting multiple vendor equipment to interoperate, according to Trav Waltrip, vice-president of telecommunications at The Travelers Corp. in Hartford, Conn.

"We don't have the resources to chase a large number of suppliers and support interfaces among their [proprietary] products," Waltrip said. "When we pick a vendor, we stick with it until there is a revolutionary change in the technology."

Before selecting a supplier, The Travelers carefully reviews the track record of each potential company and the functionality of its products and services. Like Xerox, price is an important but secondary issue to the quality of the product and the reliability of the supplier.

Single-sourcing specific services or equipment enables network managers to cultivate stronger relationships with suppliers that yield tangible benefits for both sides.

In a good working relationship, suppliers become an integral part of the net planning team and care as much about the health and vitality of the firm's network as the company's own staff, according Stanley Welland, manager of corporate telecommunications at General Electric Co. in Fairfield, Conn.

"The only reliable way for companies today to protect their networks from outages is to establish close working relationships with their vendors," Welland said.

Xerox has found that designating a vendor as a preferred supplier makes the company more, not less, competitive. Preferred suppliers often view other vendors that contact their client as intruders on their turf and usually offer lower prices or increased service as a result, Bolton said.

"Preferred suppliers become extremely territorial and will do all kinds of things to make sure they hang on to our account," he added. ◘

Executive Briefs

continued from page 21

E-mail testimonials. The Electronic Mail Association (EMA) recently published a booklet that will help educate managers on the benefits of E-mail. "The Electronic Mail Advantage: Applications and Benefits" provides examples of how electronic messaging has cut costs, saved time and yielded a competitive advantage in 12 industries. The guide is written for middle and senior-level managers who are contemplating implementing an electronic messaging system.

The booklet can be obtained free of charge from the EMA by calling (703) 875-8620. ◘

Users not reaping integration benefits

continued from page 21

Inc., said his organization has benefited both economically and strategically since it began viewing voice and data communications as a single resource.

"Bringing voice and data under a single management has allowed us to develop and coordinate new technologies that involve both, like ISDN," he said. "Everything from voice mail to building distribution systems is all within the purview of my group."

Monday said this singular perspective has allowed his group to develop a pilot application using Integrated Services Digital Network Primary Rate Interface facilities from a local exchange carrier to link J.C. Penney retail outlets to the host data center. The application will enable stores to communicate more cost-effectively than leasing multiple T-1 lines.

"Since we've bundled voice and data technologies and applications under one [group], we've been able to add capabilities to our network that we couldn't have done as easily or cost-effectively in the past."

The Travelers' Waltrip said his company has been reaping similar benefits since it merged its voice and data departments six years ago. Prior to the merger, the company supported dual organizations with often overlapping functions. Today, Waltrip's department is responsible for providing all voice, data, video and imaging services to corporate customers.

"At the basic level, voice and data technicians really handle the same kind of technology, which is computer software driving digital things. It's only sensible to roll the two groups of specialists into a unified whole," Waltrip said.

He added that the merger has reduced overhead in high-priced resources such as system engineers and has vastly improved network planning and efficiency. Combining voice and data has also given the company more leverage with vendors because it can negotiate deals simultaneously and obtain larger discounts for products and services.

"There is significant efficiency obtained when you have everyone contributing to a single network design, rather than one group planning a voice environment and another planning a data network environment," Waltrip said.

"A voice mail system doesn't stand alone from a client/server system, so it's important to think whole systems and not break it down into a voice piece or a data piece," he added. ◘

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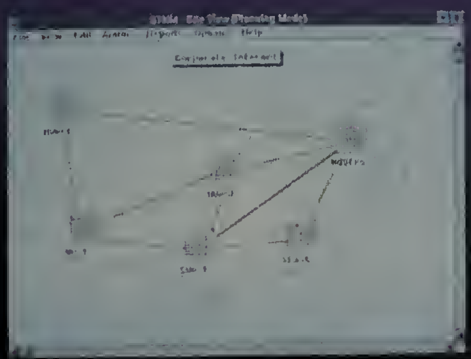

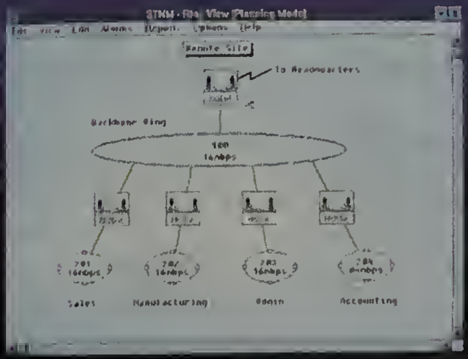

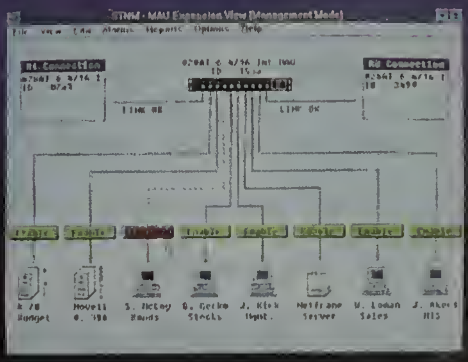

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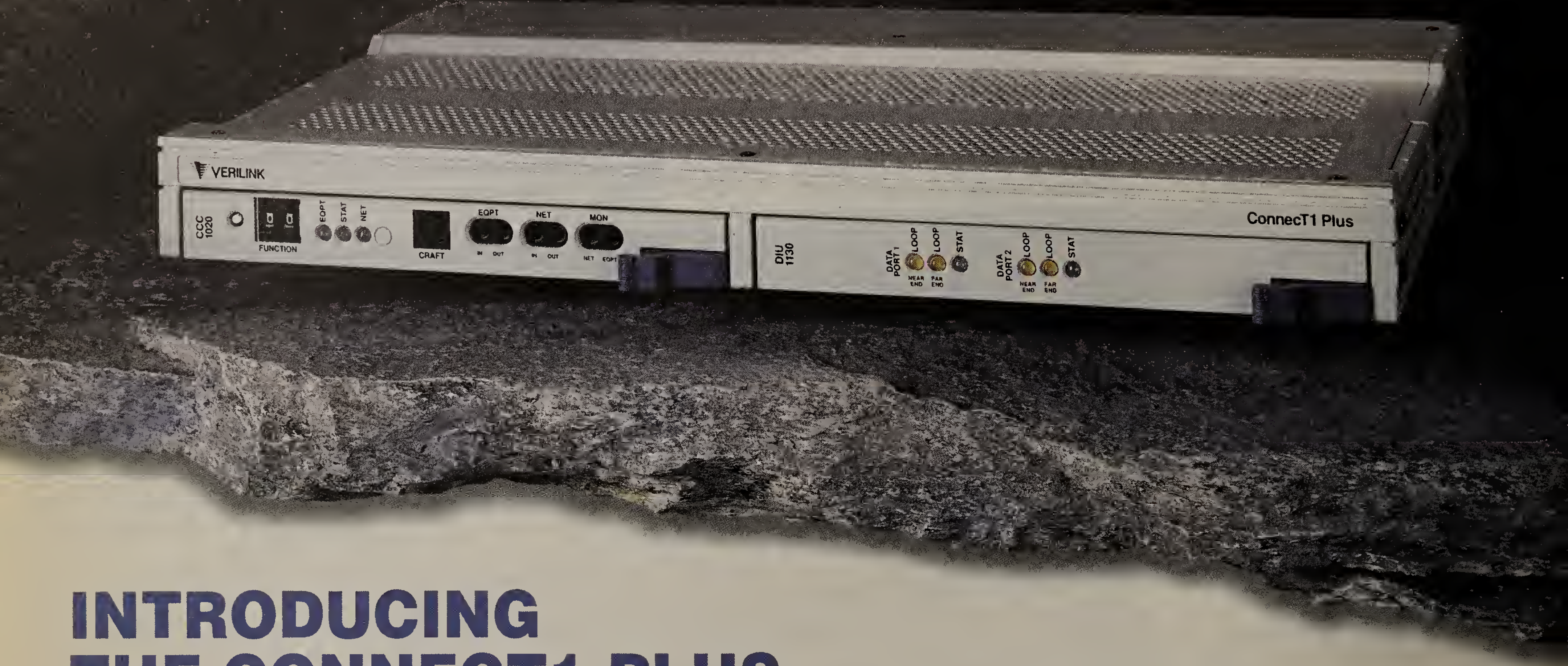

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World News

Satellite equipment and service provider **GTE Spacenet Corp.** in Rockville, Md., soon expects to announce an agreement with the government of the Soviet Union to provide communications services to the six largest hotels in Moscow, according to James MacDonald, the company's vice-president for network services.

MacDonald and other GTE Spacenet officials declined to provide further details on the deal.

At a meeting of its board of governors in Kuala Lumpur, Malaysia, earlier this month, the **International Telecommunications Satellite Organization** approved applications by the U.S. and Germany to use the Soviet Union's Intersputnik satellite system to provide international switched services.

Specifically, INTELSAT said that U.S. carriers may use as many as 90 switched 64K bit/sec circuits while German carriers may use 10 switched 64K bit/sec circuits to provide international public switched telephone services.

Germany's circuits will supplement several international switched circuits already in operation in eastern Germany.

INTELSAT's move is in compliance with recent policy changes that ended INTELSAT objections to the provision of as many as 100 international switched circuits on satellite systems that compete with the INTELSAT system.

(continued on page 26)

France Telecom pierces U.K.'s X.25 data market

Acquires giant British packet-switching network.

By Maureen Molloy
Staff Writer

LONDON — France Telecom this month made its most aggressive business move outside its national borders when it acquired the X.25 packet-switching network of the London Regional Transport Co. (LRT) in the U.K. for an undisclosed amount.

A new France Telecom subsidiary, Transpac Network Services, Ltd., will operate LRT's data network, which currently handles nearly 80% of the U.K.'s X.25 data traffic. This CentreNet network consists of dedicated lines in a meshed configuration that support more than 15,000 end users at 100 sites within central London.

A trend toward deregulation is spurring cross-border competition.

▲▲▲

Patrick Bure, director of France Telecom's London operations, said the company's expansion into the U.K. is the first step in a strategy to establish a pan-European data network with links to the rest of the world. The strategy includes further acquisitions of private X.25-based networks such as CentreNet, he said.

"Our priority is to promote international expansion to better meet customers' global communications needs," Bure said.

Although Transpac has no plans to compete with British Telecommunications PLC in its core business of providing basic telephone service, Bure said the company plans to build a U.K.-wide network of switches and leased lines by the end of 1992. It hopes to have two million users in the U.K. by 1995.

France Telecom already has one of the world's largest X.25 data networks with more than 5.5 million subscribers domestically. The net currently handles about seven million calls a day and 86,000 direct-line connections. It also supports the French Minitel service, an electronic yellow pages directory.

The X.25 net currently supports business transactions such as file inquiry and transmission, data capture, electronic mail and electronic data interchange. The company also plans to offer frame relay by the end of 1992.

Transpac is the first wholly owned venture outside of France for the state-owned telephone company. The acquisition points to the growing competition among the European post, telephone and telegraph administration monopolies to obtain market share outside of national borders.

Because most PTTs enjoy a monopoly over most communications services, each company previously limited its business to its home country. But Bure said a European trend toward telecommunications deregulation during the past few years has eroded industry boundaries and is spurring cross-border competition.

"Like other major carriers, we're placing greater emphasis on developing and expanding our international data networks via investments and acquisitions," he said. ▣

Start-up offers cut-rate calling

IDT pricing vs. foreign carrier pricing

Country	Charge for 5-minute call to U.S. during peak period		Savings
	Foreign carrier*	IDT**	
Argentina	$16.24	$12.48	23%
Belgium	9.84	7.32	26%
Brazil	19.90	10.03	50%
Colombia	10.41	8.29	20%
France	9.35	7.35	21%
Germany	10.60	7.81	26%
India	15.21	11.45	25%
Israel	13.71	9.64	30%
Italy	19.48	9.62	51%
Jamaica	6.67	5.17	22%
Saudi Arabia	12.00	9.20	23%
Soviet Union	54.68	27.46	50%
Spain	19.92	10.52	47%
U.K. (British Telecommunications PLC)	5.25	4.22	20%
Venezuela	6.25	4.72	24%

*Based on tariff information from Lynx Technologies, Inc., Little Falls, N.J.
**For IDT's international callback service

SOURCE: INTERNATIONAL DISCOUNT TELECOMMUNICATIONS CORP., NEW YORK

GRAPHIC BY SUSAN J. CHAMPENY

Start-up undercuts foreign PTTs' prices

Overseas users could get up to 75% discount by tapping U.S. networks for international calls.

By Barton Crockett
Senior Editor

NEW YORK — A start-up firm based here is launching an international calling service that offers users discounts of up to 75% on foreign PTT charges.

International Discount Telecommunications Corp. (IDT) is taking advantage of the wide gap between the prices U.S. carriers charge for international calls and those charged by foreign service providers.

IDT is providing a way for users abroad to access the networks of U.S. carriers in order to make calls at prices close to those charged by U.S. providers and well below the often inflated rates of foreign post, telegraph and telephone administrations.

Howard Jonas, IDT's president and founder, is betting that large corporations will use the service to support foreign offices that can't be economically linked to global private networks.

IDT's first customer is NBC, which is experimenting with the service to support personnel in Barcelona, Spain, who are preparing for the network's coverage of the 1992 Summer Olympics.

"It's as scary for us to compete against AT&T and France Telecom as it was for Apple to compete against IBM," Jonas said. "But only in America could a little company in the Bronx come

(continued on page 26)

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World News

continued from page 25

Previously, INTELSAT policies called for the international satellite consortium to have a total monopoly on the provision of international public switched telephone services via satellite.

INTELSAT receives about two-thirds of its revenues from international public switched services.

INTELSAT ratification should pave the way for the Federal Communications Commission to approve applications by U.S. carriers, including AT&T, IDB Communications Group, Inc. and TRT/FTC Communications, Inc., to provide international switched services via Intersputnik.

US Sprint Communications Co. recently said it is providing Tele2, an upstart carrier in Sweden, with an eight-node, high-speed public data net that will be based on US Sprint's Telenet packet switches. Tele2 will use the net to provide X.25-based public data network services. Tele2 is planning to become Sweden's second full-service carrier.

Separately, US Sprint announced the establishment of a joint venture, called Marconi-Sprint, Lda, with Companhia Portuguesa Radio Marconi, Portugal's international carrier. Marconi-Sprint will provide a gateway into the SprintNet value-added network, as well as store-and-forward facsimile, international virtual private net and international private-line services. ◼

Start-up undercuts foreign PTT prices

continued from page 25

up and handle the Olympics for NBC."

Users abroad access IDT's international service by calling a company node in New Jersey equipped with custom-designed call processors that connect callers into the U.S. public switched telephone network. Users access the node either through a U.S. carrier's international toll-free calling service or a foreign carrier's standard international calling service.

If a caller uses a foreign PTT's standard service, the call processors recognize the call and are programmed not to answer it. Instead, the processors call the user back at a preestablished number using international calling services from U.S. carriers.

Once linked into the IDT node, users can complete calls to any U.S. or foreign location.

Calls are billed to IDT by U.S. carriers at rates that are usually less expensive than foreign carrier rates. IDT then rebills customers at marked-up rates to cover operational costs and turn a profit.

Since IDT relies on existing public net facilities to support its service, users can access it from virtually any country in the world.

IDT is now deploying 150 of its customized call processors in its New Jersey node. Each processor can link one foreign caller to the U.S. public network.

Hefty discounts

Even with the markup, IDT is able to offer hefty discounts (see graphic, page 25). For example, IDT undercuts foreign carrier prices for five-minute international calls to the U.S. from most Western European countries by 20% to 30% during peak calling hours.

> IDT undercuts foreign carrier prices for five-minute international calls to the U.S. from most Western European countries by 20% to 30% during peak calling hours.
>
> ▲▲▲

The company also undercuts by 51% the rates Italy's international carrier charges for a five-minute call to the U.S. during peak calling periods and the Soviet Union's Ministry of Posts and Telecommunications' rates for a similar call from the Soviet Union to the U.S. by 50%.

Discounts are greatest for long-distance calls during off-peak hours. For example, IDT's steepest off-peak discount is 75% for 10-minute calls from Spain to the U.S.

Jonas added that the company is able to beat nearly all foreign carrier charges for calls between continents. The only situation in which IDT typically doesn't offer a discount is an international call between foreign countries on the same continent.

Jonas said the company is marketing its network service to several large firms, such as ABC and Federal Express Corp. A net manager at a company that has been approached by IDT said the service looks interesting but questioned whether the quality of international phone calls would be acceptable.

The manager added that callers may object to using hand-held dialers to generate dual-tone multifrequency (DTMF) tones in order to use the service. Callers need to generate DTMF tones in order to enter access codes and telephone numbers into IDT's call processors.

Hand-held dialers are used because DTMF-compatible telephones, commonly called Touch-Tone phones, are not readily available abroad. The network manager's firm has not decided whether to trial IDT's service. ◼

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According to The Adams Company Internetworking Pilot, **Network World** readers are more involved in purchasing enterprise networking products and services in the 22 critical areas listed than readers of Communications Week, Data Communications and Networking Management.

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17. Personally involved in spending over $100K on voice communications systems in the past 12 months.
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21. More than $1 billion in total company sales.
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PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

SP Telecom advances videoconferencing

Alternative carrier **Southern Pacific Telecommunications Co. (SP Telecom)** recently introduced a switched videoconferencing service called **Media Express.**

Media Express enables customers to dial up 112K, 384K or 768K bit/sec channels on SP Telecom's nationwide fiber-optic network. The service is billed in one-minute increments and will support any vendor's videoconferencing equipment. Users access the service by connecting to the nearest of SP Telecom's 96 points of presence via a leased T-1 circuit.

Media Express includes a directory that can be displayed on videoconferencing systems equipped with a control console. The directory enables users to determine which numbers to dial on the control console's keyboard in order to reach certain sites.

Users can build a customized directory listing all the sites on an internal videoconferencing network, while SP Telecom provides a public directory listing all Media Express customers.

SP Telecom intends to sell the service through small regional interexchange carriers as well as through resellers of Videotelecom Corp.'s videoconferencing systems. Pricing for the service has not been finalized.

Southern Pacific Telecommunications Co., 26899 Northwestern Highway, Suite 120, Southfield, Mich. 48034; (313) 356-2090.

Systems Strategies adds TCP/IP to Express

Systems Strategies, Inc. recently added **TCP/IP Networking Services** to its Express line of Unix-to-IBM software.

The addition of TCP/IP Networking Services to Express Release 1.1 enables workstation users on a Transmission Control Protocol/Internet Protocol network to access one or more IBM hosts via a single gateway.

With earlier releases of the software, users had to load Ex-

(continued on page 28)

Unix tool lets applications communicate

By Caryn Gillooly
Senior Editor

MOUNTAIN VIEW, Calif. — SunSoft, a Sun Microsystems, Inc. subsidiary, last week rolled out a software package that will enable Unix applications to communicate interactively without user intervention.

The software makes it possible, for example, to update a chart created with spreadsheet data by updating the spreadsheet.

ToolTalk, SunSoft's first product, contains three components: an application program interface (API), a library and a software server.

To implement ToolTalk, programmers write the C-based API calls housed in the library directly into new programs or into existing programs, which must then be recompiled. Recompiling existing programs should not take more than a few days for each application, according to Rich Green, ToolTalk engineer for SunSoft, based here.

The server software is where applications are registered and their relationship to other applications is defined. Once registered, one updated application will change others as required by initiating remote procedure calls (RPC).

ToolTalk works in conjunction with Sun's Open Network Computing RPC, acting as a centralized application to which all RPCs are forwarded. Because all applications are registered to a central process, rather than being designed for communications between two specific applications, they can be independent from one another, said Nancy Haydt, marketing manager of project technologies at SunSoft.

Since applications enhanced to support ToolTalk are designed to communicate with the central server component, system administrators can add other applications to the network without having to go back and recompile previously upgraded programs.

ToolTalk will be available in the fourth quarter. Prices have not been set.

For further information, contact SunSoft at 2550 Garcia Ave., Mountain View, Calif. 94043, or call (415) 336-0678.

Standards-based, low-end hub offers built-in bridge

By Timothy O'Brien
West Coast Bureau Chief

MILPITAS, Calif. — Network Resources Corp. (NRC), a provider of products for Apple Computer, Inc. AppleTalk networks, recently announced the MultiGate Hub, a low-end 10BaseT Ethernet hub that includes network management software and a built-in bridge.

NRC's new product, its first bid in the competitive hub market, supports traffic isolation features and can accommodate different types of internetwork links and remote net management. "We are committed to supporting standards such as 10BaseT and Ethernet, as well as working toward protocols like [the Simple Network Management Protocol]," said Bradley Brown, product marketing manager at NRC.

Each hub supports 24 unshielded twisted-pair workstation ports and can be outfitted to support thick or thin coaxial cable, twisted-pair or fiber-optic backbone connections.

The MultiGate Hub's built-in bridge filters packets by various protocols, a capability that can improve security by preventing specific protocols from traveling between networks. In addition, the bridging capability can reduce overhead on the backbone network by containing intrawork group traffic within the hub.

For use with the MultiGate Hub, NRC is offering the MultiGate Manager, graphics-based network management software that runs on Apple Macintosh workstations. A version of MultiGate Manager for Microsoft Corp.'s Windows is scheduled for later release.

All aspects of the hub — including configuration, network traffic display and troubleshooting — can be managed remotely using the software.

Although the MultiGate Hub will be attractive to users in the Macintosh connectivity niche, Brown said he believes the product will compete in the broader network market. He anticipates that users will find the increased capabilities of small intelligent hubs more cost-effective than large concentrators.

The $3,495 MultiGate Hub will be available this month.

For further information, contact NRC at 736 S. Hillview Drive, Milpitas, Calif. 95035, or call (408) 263-8100.

Simpact adds voice link to Lotus Notes

Product integrates LANs with PBXs to enable users to create, store and replay voice messages.

By Eric Smalley
Senior Editor

SAN DIEGO — Simpact Associates, Inc. has introduced a client/server application that integrates voice messages with Lotus Development Corp.'s Lotus Notes documents.

Remark for Lotus Notes consists of a Simpact voice processing server, server software and client software. The Remark server connects to both a local-area network and a private branch exchange, allowing end users to use their telephone to record and play back the voice components of compound Lotus Notes documents.

With Remark, users running Lotus Notes under Microsoft Corp.'s Windows 3.0 can embed voice objects in Notes documents. These voice objects can be manipulated in the same manner as text and images in Notes documents, according to company officials.

To add a voice element to a Notes document, a user initiates the Remark program from within the document. A control box with record, play, pause, restart, fast forward and rewind buttons appears on the user's screen. When the user clicks on the record button, the Simpact server initiates a call to the user's phone. The user creates the voice message via the phone and the control box.

When the user hangs up, an icon indicating the presence of the message appears in the Notes document. Any user accessing the document can then click on the icon, directing the server to retrieve the message and initiate a call to that user's telephone. Playback of the message is controlled through the on-screen control box.

Remark can store voice mail messages as well as voice messages created by Notes users in Notes documents. It can also be used by remote users with access to the Remark server.

By using existing workstations, LANs, PBXs and telephones, Remark offers advantages over existing multimedia applications, a company spokeswoman said.

As the company upgrades the product, it will do so at the server level, not at each workstation, she said. Also, by using telephones instead of microphones and speakers, Remark offers a higher degree of privacy.

The Simpact Voice and Telephony Server consists of an Intel Corp. 80386 microcomputer, a voice processor, network interface card and server application software. Remark is compatible with Centrex and most PBXs.

A Remark system with a license to support four concurrent users costs $25,000. Remark is available now.

For more information, contact Simpact at 9210 Sky Park Court, San Diego, Calif. 92123, or call (619) 565-1865.

AT&T Paradyne modems can be upgraded by phone

Firm can download options, enhancements.

By Jim Brown
Senior Editor

LARGO, Fla. — AT&T Paradyne recently unveiled the Comsphere 3800 series, a line of modems that can be upgraded with optional features by downlineloading software instead of swapping out boards.

The firm also introduced a microcomputer-based management package for the modems called the Comsphere 6700 Dial Network Management System (DNMS).

The Comsphere 3800 Software Defined (SD) modems include the Comsphere 3810 and Comsphere 3820 stand-alone units and the Comsphere 3811 modem board for the Comsphere 3000 Series Carrier chassis.

All three modems come from the factory with software supporting CCITT's V.32bis and V.42bis standards. V.32bis defines modulation schemes supporting up to 14.4K bit/sec, while V.42bis defines error correction and a data compression technique enabling V.32bis modems to achieve throughput of up to 57.6K bit/sec under optimal line

(continued on page 30)

First Look

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press 3270 emulation software and protocol conversion software onto the same node in order to establish a host link.

Now Systems Strategies has developed a client/server implementation of the software so that the protocol conversion engine, which translates TCP/IP data into Synchronous Data Link Control packets and vice versa, can run as a gateway on any node in the network. In addition, the client workstations can run the 3270 emulation software in order to establish a host connection through the gateway.

This setup distributes processing across the network so that client workstations can handle 3270 processing while the gateway handles protocol conversion. The software supports a range of client workstations, including Unix-based 80386 and 80486 systems, as well as Sun Microsystems, Inc. and IBM RISC System/6000 workstations.

Release 1.1 of Express with TCP/IP Networking Services sells for $1,000 for the server software, plus $3,000 for a 20-user license for client workstations.

The software will be available for 80386- and 80486-based Unix systems in July and for RISC System/6000s in August.

Systems Strategies, Inc., 225 W. 34th St., New York, N.Y. 10001; (212) 279-8400.

(continued on page 30)

Xerox offers distributed message tool

By Ellen Messmer
Washington Correspondent

At the recent International Convention and Exposition of the Armed Forces Communications and Electronics Association (AFCEA), several vendors unveiled new products.

Xerox Corp. announced its Xerox Distributed Message System, designed to replace the antiquated, manual message distribution methods deployed by some U.S. defense forces today.

Using an array of commercial off-the-shelf components, the Xerox system conforms to government required standards such as the Government Open Systems Interconection Profile and the Portable Operating Systems Interface for Computing Environments.

Specially designed to interface with the Defense Data Network, the Automatic Digital Network and the Defense Special Security Communications System, the Xerox messaging system includes encryption units, X Window support, Xerox message processors, printer port emulation, communications support processors, local- and wide-area network interfaces, as well as an optional Defense Department Transient Electromagnetic Pulse Emanations Standard configuration.

Xerox said the system will be available in the fourth quarter.

Also at the AFCEA show, Harris Corp. announced the availability of its Secure Mission Conferencing System.

Based on the Harris 20-20 integrated voice/data switch, the Harris system provides audioconferencing in a secured environment for hundreds of callers at a single site or across a network.

As many as 99 secure conferences can be in session at any time. Upgrades to the 20-20 switch also support Integrated Services Digital Network Primary Rate Interface lines for the first time. A new handset, the Harris Optic VII Teleset, provides a variety of secure communications features.

And Simpact Associates, Inc. introduced its new CNS 6200 communications server for military WANs. CNS 6200 supports Transmission Control Protocol/Internet Protocol to connect to Ethernet LANs and provides eight serial ports to connect to wide-area communications lines. Simpact said the product is designed to accommodate the common military LAN requirement to establish access to WAN communications outside the LAN. ☒

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All countries have rules and procedures associated with attaching telecommunications equipment to networks. However, countries differ on which of a variety of technical standards should apply to those devices that will be integrated into a network.

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- The type approval process as part of marketing strategy.
- The role of international standards.
- How countries approach equipment certification.
- Overview of testing options.
- Country approaches.
- Regional approaches.
- Do's and don'ts of global certification projects.

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The seminar will be held on Monday July 15 and half a day on Tuesday, July 16 during ComNet West. The cost will be $695.

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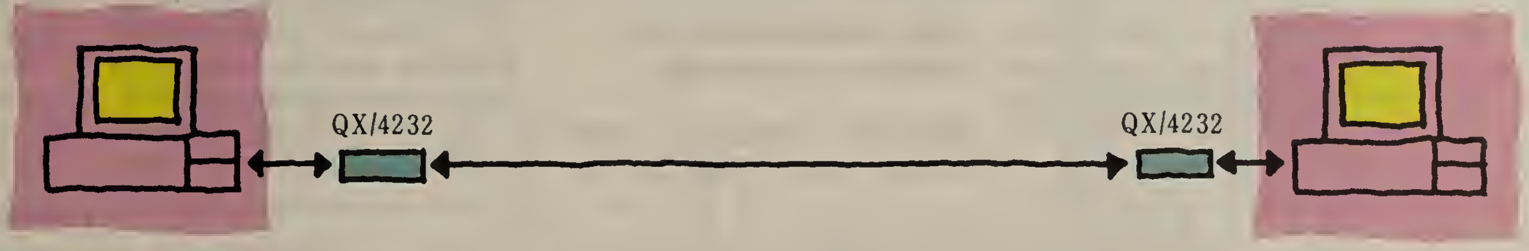

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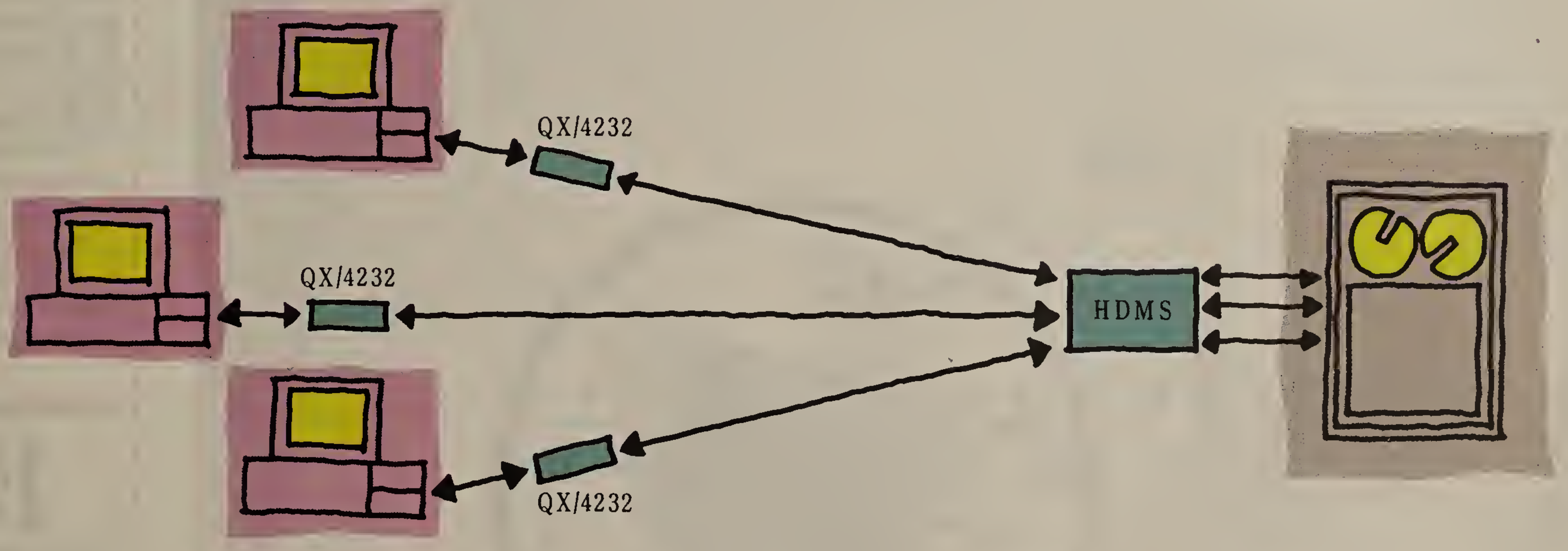

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Circle Reader Service #106

First Look

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Astrocom intros fractional T-1 DSU/CSU

Astrocom Corp. recently announced a data service unit/customer service unit (DSU/CSU) for fractional T-1 services. The user port of the **NX1 LP** DSU/CSU can support user port data rates of either 56K or 64K bit/sec in channel multiples from one to 24 and network links at speeds up to the 1.54M bit/sec full T-1 rate.

The NX1 LP supports superframe and extended superframe formats, as well as bipolar eight zero code substitution and alternate mark inversion formats.

It is available now for $2,095.

Astrocom Corp., 120 W. Plato Blvd., St. Paul, Minn. 55107; (612) 227-8651.

NSA emulator minimizes memory requirements

Network Software Associates, Inc. (NSA) has announced a new multisession Distributed Function Terminal 3270 emulator for DOS-based IBM and compatible personal computers designed with the intent of minimizing memory requirements. The emulator, called **3270/ElitePlus** takes up 77K bytes of random-access memory per LU 2.

The 3270/ElitePlus emulates an IBM 3278 (Model 2, 3, 4 or 5) display station or a 3279 (Model 2A or 2B) display as well as one or two IBM 3287 printers.

The product costs $395 per copy, while a network license for use with NSA's AdaptSNA LAN Gateway is priced at $1,295.

Network Software Associates, Inc., 39 Argonaut, Laguna Hills, Calif. 92656; (714) 768-4013. ◻

Modem upgrade by phone

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conditions. The Comsphere 3810 and Comsphere 3811 operate on dial-up, two- or four-wire leased lines, while the Comsphere 3820 operates over dial-up or two-wire leased lines. Optional software enables the Comsphere 3810 or Comsphere 3811 to work with existing four-wire leased line modems that support CCITT V.33, which defines an operating speed of 14.4K bit/sec, or V.29, which defines an operating speed of 9.6K bit/sec.

Each Comsphere 3800 SD modem can be upgraded to support optional software features, such as that supported by the V.33 and V.29, by dialing into AT&T Paradyne's Remote Software Support Center here and requesting upgrades. Customer service personnel dial the modem back and downline-load the new software.

Each modem transmits asynchronous or synchronous data in full or half duplex.

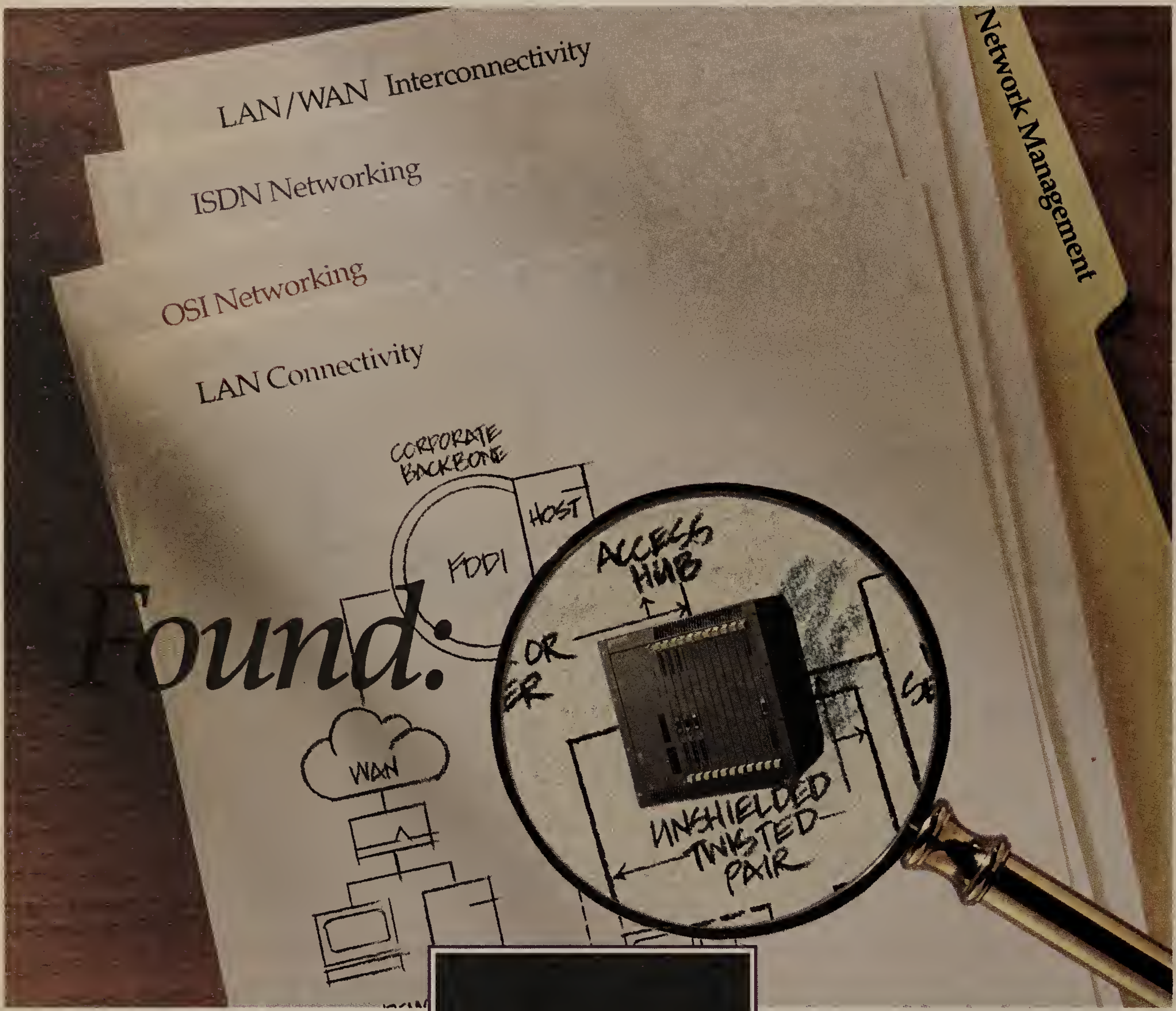
▲▲▲

Each modem transmits asynchronous or synchronous data in full or half duplex and supports the Hayes Microcomputer Products, Inc. AT command set, as well as the CCITT V.25bis and RS 366A autodialing protocols.

Comsphere 3800 SD standalone modems and boards housed in a Comsphere 3000 Series Carrier chasis can be upgraded to support optional network management software, thus making them controllable from microcomputers running Comsphere 6700 DNMS software.

With Comsphere 6700 DNMS, central site users can monitor the operation of 128 central site modems and 872 remote modems.

The Comsphere 3810, Comsphere 3811 and Comsphere 3820 cost $1,595, $1,495 and $1,395, respectively. The 6700 DNMS is priced at $2,500. The optional network management software costs $200, while the optional V.33 software is priced at $300 and the optional V.29 software costs $500. ◻



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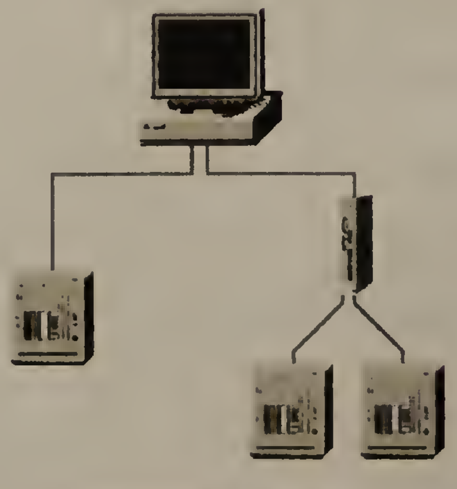

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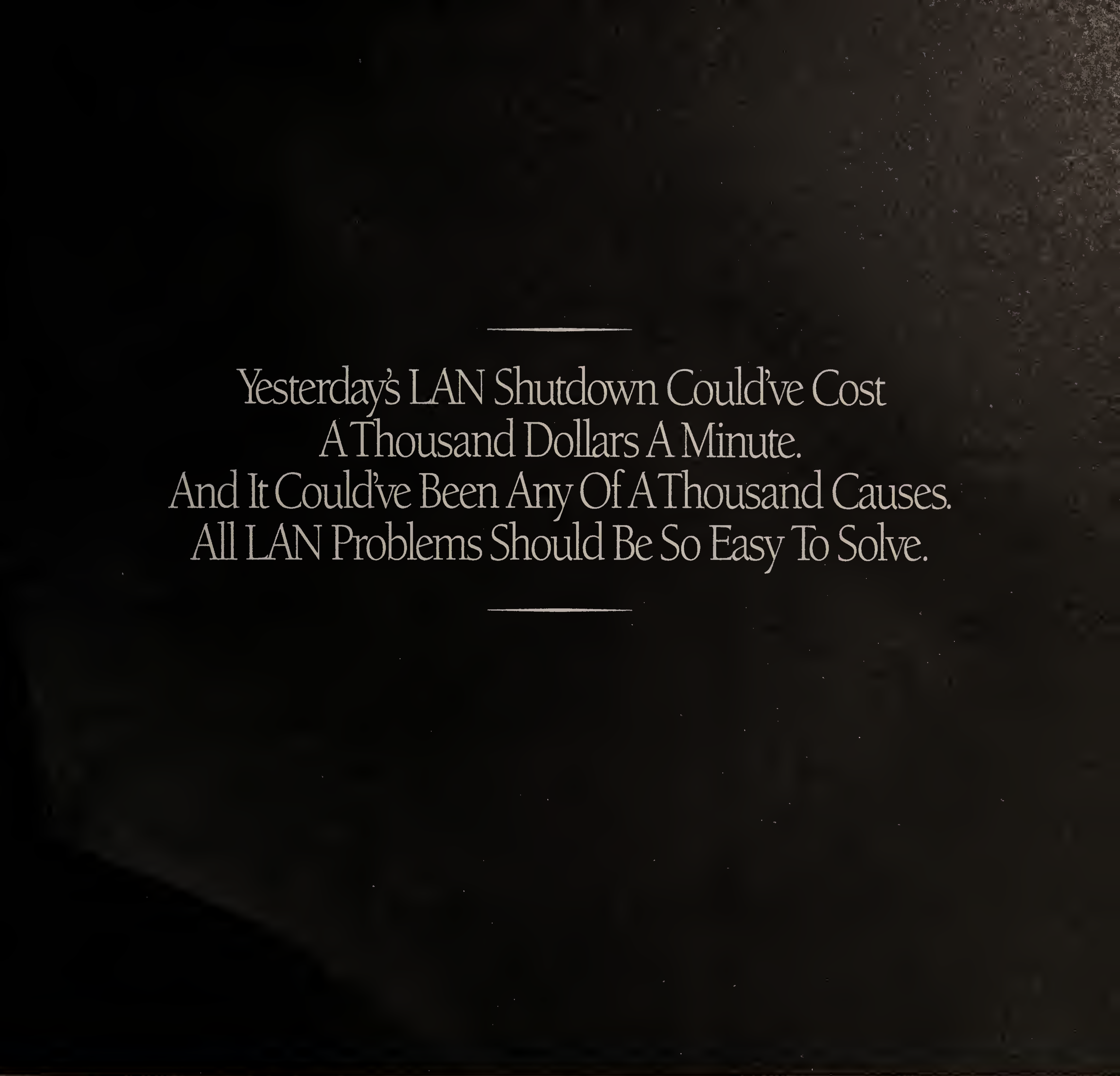

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OPINIONS

INTEREXCHANGE CARRIERS

BY EDWARD HORRELL

Some advice for the Big Three carriers

The long-distance business has gotten out of hand.

I'm talking about the new MCI Communications Corp. deal, the one where you get 20% off when you call another MCI user who's on your list of friends and family.

That sounds like a pyramid scheme. And it scares me. It scares me because it means the company has reached the point where it doesn't have anything to sell against its competition anymore.

Telecommunications represents one of the largest expenses a business incurs. The technology deserves simple-to-understand and easy-to-price services that the typical business executive can use to be more efficient in business — not a pricing program that requires customers to know advanced mathematics in order to comprehend it.

But pricing appears to be all the long-distance carriers have to sell these days. Not service, even though they each claim to be the best. Not features, although each has a portfolio of uniquely named gizmos. Not customer support, because there is no such thing in the long-distance business.

> Users are soon going to begin to show more loyalty to one carrier based upon support, quality and service.
>
> ▲▲▲

Message to the Big Three

Users are soon going to begin to show more loyalty to one carrier based upon support, quality and service. But these elements are going to have to be demonstrable, not just the results of being the biggest.

So on behalf of users, I'm offering the following advice to the Big Three:

■ **AT&T:** Show me. Quit telling me how big you are. I don't want to hear about answerback supervision and connect time.

Quit scaring me with commercials about calls on other carriers going to the Philippines. Show me what you can do for me. Show me what separates you from the other two big carriers. Only then will I be able to justify letting you charge me more.

Step up to a higher league and bring better or easier to understand services to the end user. Kill me with support.

■ **MCI:** Decide what you want to be when you grow up. Are you a discount company or a feature-rich carrier?

You managed to get some opportunities early on with your card services, voice mail and such. But sell your strengths and get out of this price war you're in. You can't win in a price war in the long run. You should be selling applications for your unique services, not prices. Make yourself an alternative to AT&T based upon applications, not based upon price.

■ **US Sprint Communications Co.:** You've come a long way. Clean up your network and billing, which could be the best in the business, and sell yourself to me as the complete alternative to AT&T at a big discount. If price is all you've got to sell, you've got to be cheaper.

Personally, I kind of liked the days when users with a little smarts could configure a long-distance network that took advantage of pricing schemes, bringing down their cost per minute to a pretty low number.

Today, there is no room for creativity, at least not in system design.

Horrell is president of The Horrell Consulting Firm, Inc. in Memphis, Tenn.

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President, Communications Managers Association

Donna Kwak
Senior Vice-President
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Chuck Papageorgiou
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Telecommunications Users

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International Communications Association

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Manager, Corporate Telecommunications
General Electric Co.

EDITORIAL

Wanted: Network computing applications and tools

Recently, we held a series of meetings with key executives of top user and vendor companies.

From these conferences, one concern emerged time and time again: Users are being held back by a lack of network-based applications — from server-based and client/server applications to true distributed applications — and the tools to build them.

From a physical connectivity perspective, users are forging ahead in establishing enterprise networks. To be sure, obstacles to that effort remain. But these companies are really building physical network infrastructures that promise to provide users with easy access to data and sophisticated new applications.

The problem is, these applications aren't here yet, at least for the most part. (If you need proof that users are hungry for this new breed of applications, consider the rapid acceptance of Lotus Development Corp.'s Notes groupware and the emergence of the user-driven Network Applications Consortium.)

We're trapped between the current generation of applications designed for a single platform and the promised next generation of client/server or distributed applications. Network hardware gets faster and more interoperable, but development of networked applications trails far behind.

And this situation isn't likely to change any time soon.

Software houses and systems vendors are worried about maintaining their installed base of customers and achieving interoperability among their own, often chaotic product lines. They face a huge challenge moving into this new world of building networked applications.

In addition, the small companies that are striving to develop innovative new products — such as Reach Software Corp. with its work flow automation tools — don't have the resources to bring a wide range of offerings to market quickly.

Worse yet, there are precious few tools designed to help users build their own client/server or distributed applications and those that are available are complicated to use. Building applications that take advantage of the power of networking remains an arduous, time-consuming task.

Some progress is being made today, particularly in the key area of networked data bases.

But, collectively, the industry must focus on addressing the need for networked applications. Unless vendors can deliver these next-generation applications and the tools to develop them, users won't be able to realize the true potential of the public and private network infrastructures being built today.

That will sap the vitality of the entire industry.

OPINIONS

ENTERPRISE NETWORKS

BY JOHN MCQUILLAN

For users, it's the same game but with new rules

It was only a few years ago that the term "enterprise network" came into common use. At that time, many user companies' goals were to integrate voice and data, carry all traffic on a T-1 backbone and implement the emerging Open Systems Interconnection standards. Now these three goals have changed.

In the late 1980s, many telecommunications managers believed that combining voice and data on a single backbone network was one of their primary responsibilities. But as private-line and intelligent network services — particularly virtual private networks — have become more available and affordable, many organizations have replaced the goal of voice and data integration with its reverse — outsourcing.

Users are relying increasingly on carriers to manage the voice network and even some of the low-level data delivered via dial-up modem.

This shift reveals that users have consistently pursued a very simple strategy: build the most reliable enterprise network at the lowest cost. In the past, users achieved this with private T-1 multiplexers. In the future, they may rely on a virtual network service from a carrier. This trend is expected to continue with the pending arrival of intelligent network services for data, offering frame relay or Switched Multimegabit Data Services interfaces.

The second change in enterprise networking is closely related to the first. In the late 1980s, time-division multiplexers and dedicated T-1 trunks were the preferred technologies for building integrated, unified backbone networks. Now there is a growing trend toward using multiprotocol routers for data traffic and transferring voice traffic back to the public switched telephone network.

Multiprotocol routers are attractive because they support the same data communications traffic as T-1 multiplexers but on a more dynamically optimized basis. They also can handle unpredictable traffic bursts and very high traffic peaks more effectively than time-division multiplexers, which are better suited for low-data rates and better understood traffic flows.

These advantages may encourage users to discount multiprotocol routers' lack of voice support and simply switch their voice traffic to the public phone network.

> Many organizations have replaced the goal of integration with its reverse — outsourcing.
>
> ▲▲▲

In the third area of change — standards — it's become clear that users no longer expect OSI to solve all their problems. The marketplace has moved quickly toward the Transmission Control Protocol suite for communications; OSI is likely to be important more for higher level protocols, particularly for electronic mail, electronic data interchange and communication between organizations.

But for communications between diverse computer systems on one local-area network and for providing interoperability across different desktop environments, users have had to look beyond OSI. There is growing recognition among users that OSI's goals are necessary but not sufficient. While it would be desirable to be able to log on and transfer files between computer systems, these days, most computer systems in a business environment are desktops.

Therefore, the new goal is not to log onto the other system, but rather to be able to access its files, share its printers and other peripherals, and exchange program and data files with other users.

To perform these functions, the desktop operating systems must be compatible and interoperable. This is why the X Window System effort has attracted so much interest. More recently, the Advanced Computing Environment group, formed in April by Compaq Computer Corp., Digital Equipment Corp., Microsoft Corp. and The Santa Cruz Operation, Inc., has announced its intention to create new standards for microcomputer workstations.

Compatibility and interoperability have taken on a new meaning: the same software should be able to run on different machines without modification and the same data files should be interpretable on different machines. Software vendors such as Microsoft and Aldus Corp. have developed nearly identical versions of leading applications, such as Word, Excel and PageMaker, for the IBM Personal Computer and the Apple Computer, Inc. Macintosh.

In the future, we can expect the gap between Unix workstations and IBM Personal Computers running Microsoft Windows to narrow as well. The Windows environment has introduced concepts such as dynamic data exchange and object linking and embedding, which point the way toward new models for exchanging data between programs — models that no longer rely on the obsolescent OSI ideas of log on and file transfer. We are entering the world of network-based application program interfaces and remote procedure calls.

Enterprise networking is just as important as ever, but the rules of the game are continually changing.

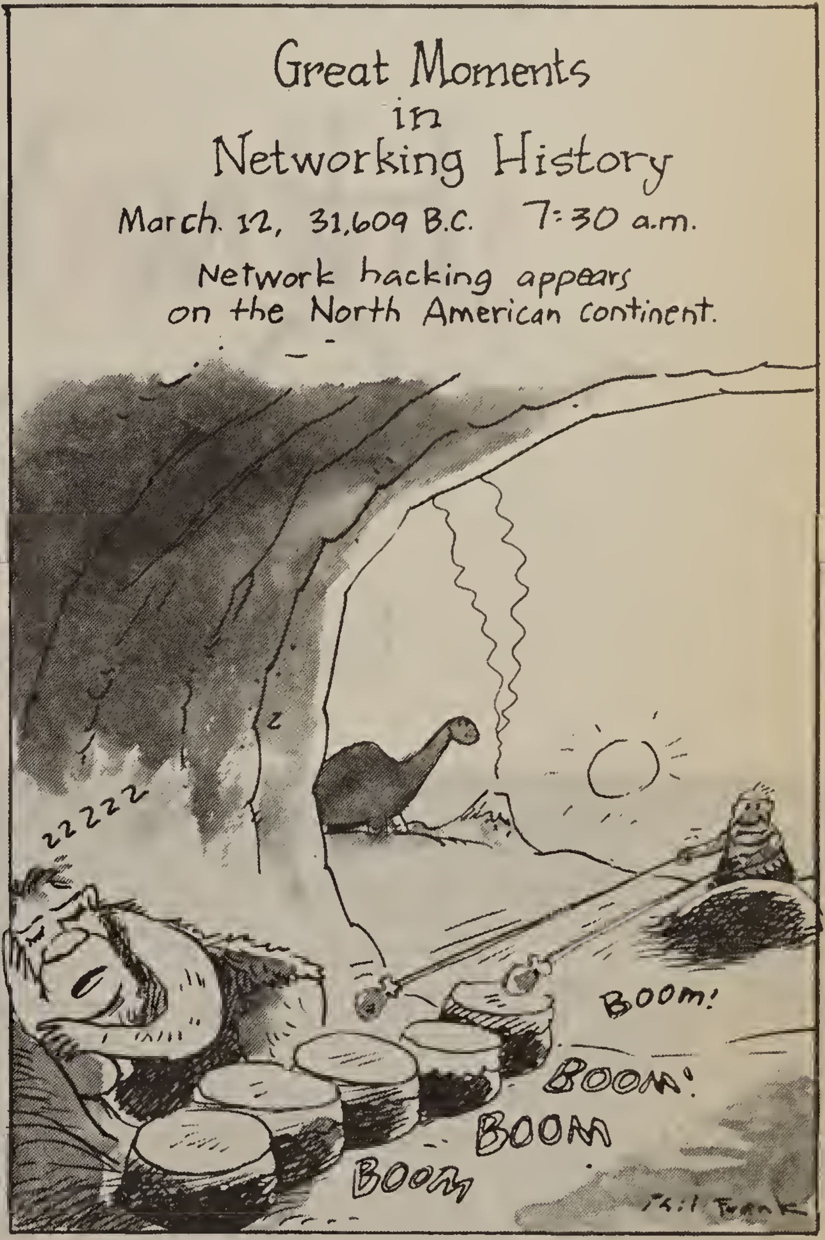
McQuillan is president of McQuillan Consulting in Cambridge, Mass. He assists users and vendors in planning communications systems.

LIKE ALLIGATORS IN A SWAMP, unforeseen problems can really put the bite on a communications operation. Many managers find themselves wrestling with these networking reptiles every day.

If you've survived an "alligator attack," share it with our readers by calling Susan Collins, associate features editor, at (508) 820-7413 or fax your idea to us at (508) 820-3467. Alligators should be 1,200 words in length and submitted either on disk or via modem.

TELETOONS

BY FRANK AND TROISE


Great Moments in Networking History
March. 12, 31,609 B.C. 7:30 a.m.
Network hacking appears on the North American continent.
zzzzz
z
BOOM!
BOOM!
BOOM
BOOM
Phil Frank

LETTERS

The trapdoor trap

In his recent column ("Trapdoor clause latest shot in an eternal war," *NW,* May 6), Benjamin Wright suggests that Congress should require cryptographic systems to include trapdoors (intentional flaws) so that no information can ever be concealed from the government.

However, it is impossible to make a useful cryptographic system that has a "master key" or trapdoor built in for the benefit of the government. Any master key would certainly be exposed. Even if it weren't, a code breaker would be certain to find it.

The U.S. (and U.S. export) market for cryptographic systems would be utterly destroyed by such a law because it is expensive and futile to employ a cryptosystem that's known to be compromised. One might as well send plain text and save money.

Wright also asserts that "privacy rights are always subject to controlled police surveillance." Maybe in Albania, but not in the U.S. The Fifth Amendment protects U.S. citizens from being forced to reveal cryptographic keys for their correspondence.

Wright suggests that building or using an unlicensed (that is, unimpaired) cryptosystem should be made a criminal offense. What should be done about paper and pencil systems? What about home computer software prepared by the user?

Will the government monitor all communications at all times to detect the presence of ciphertext generated by unlicensed cryptosystems? If enacted, such a law would either be unenforceable or unconstitutional.

Mark Seecof
Independent consultant
Santa Monica, Calif.

Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

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A network too big for its bridges

The Travelers evaluates Network Equipment Technologies' new LWX router as a potential solution for its overburdened bridged network.

CONTINUED FROM PAGE 1

work Exchange (IDNX) multiplexer. The IDNX is currently the only multiplexer that IBM markets and services.

The Travelers began testing the LWX in February and is now in the final stages of beta testing. In general, we have found that the LWX addresses many of our requirements, performing functions that are beyond the scope of our bridges. However, we've also found that the LWX is not a panacea for all of The Travelers' LAN problems. This article discusses how The Travelers tested the LWX and how the router performed.

The Travelers' current net

The Travelers' more than 200 token-ring LANs are currently interconnected using IBM's Token-Ring Network Bridge Program, which runs on IBM Personal System/2s. The LANs mainly carry Systems Network Architecture traffic from workstations to IBM mainframes and Network Basic I/O System traffic between workstations and LAN servers.

In addition, The Travelers has 14 IBM mainframes with 25 IBM front-end processors. About half of these front ends are connected to LANs. The company currently has a private T-1 network of 20 NET IDNXs carrying its LAN circuits multiplexed with its SNA Synchronous Data Link Control and voice traffic.

What we needed was a router that had multiple serial ports and a packet-switch interface built on a reliable hardware platform. In addition, the router had to be able to contain the constant data broadcasts between bridges and other IEEE 802.2 overhead and handle bursty, high-bandwidth traffic.

It was also important that the router perform automatic route

(continued on page 60)

Simon is telecommunications engineering project manager at The Travelers Corp. in Hartford, Conn.

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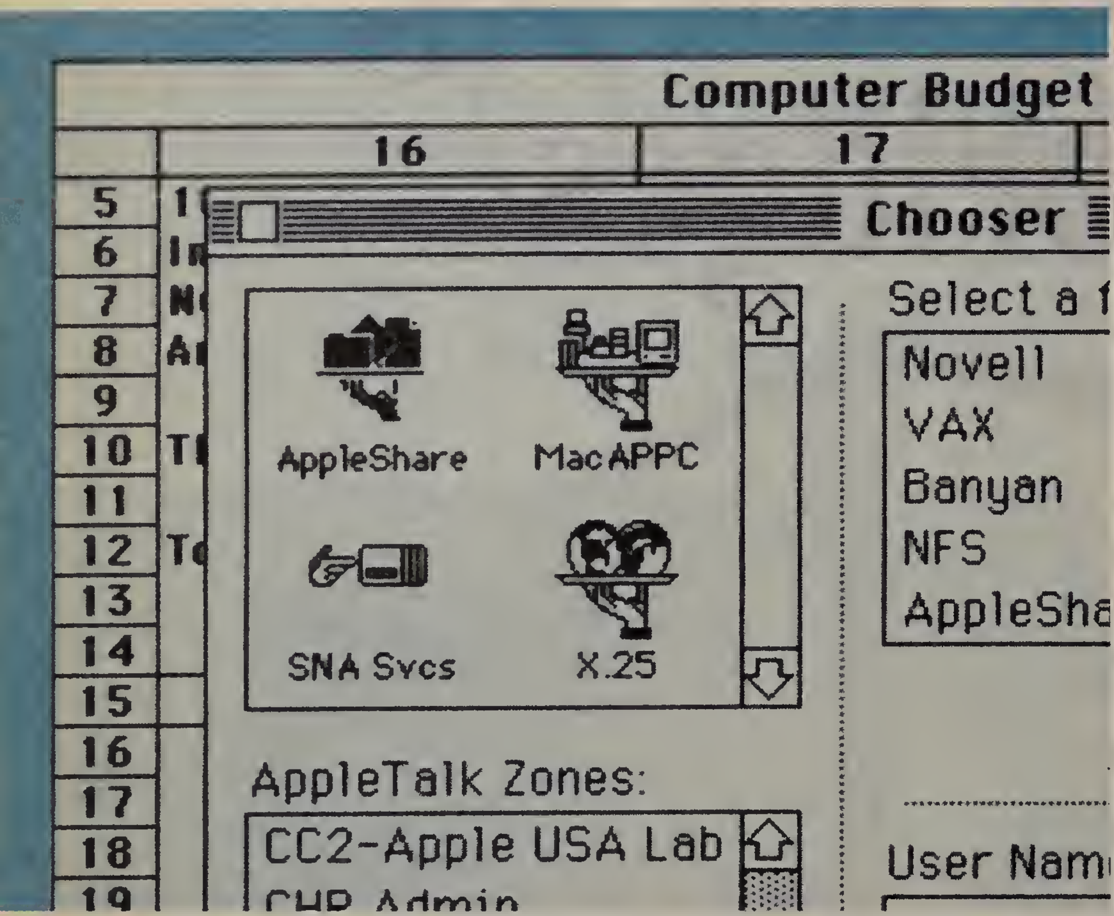
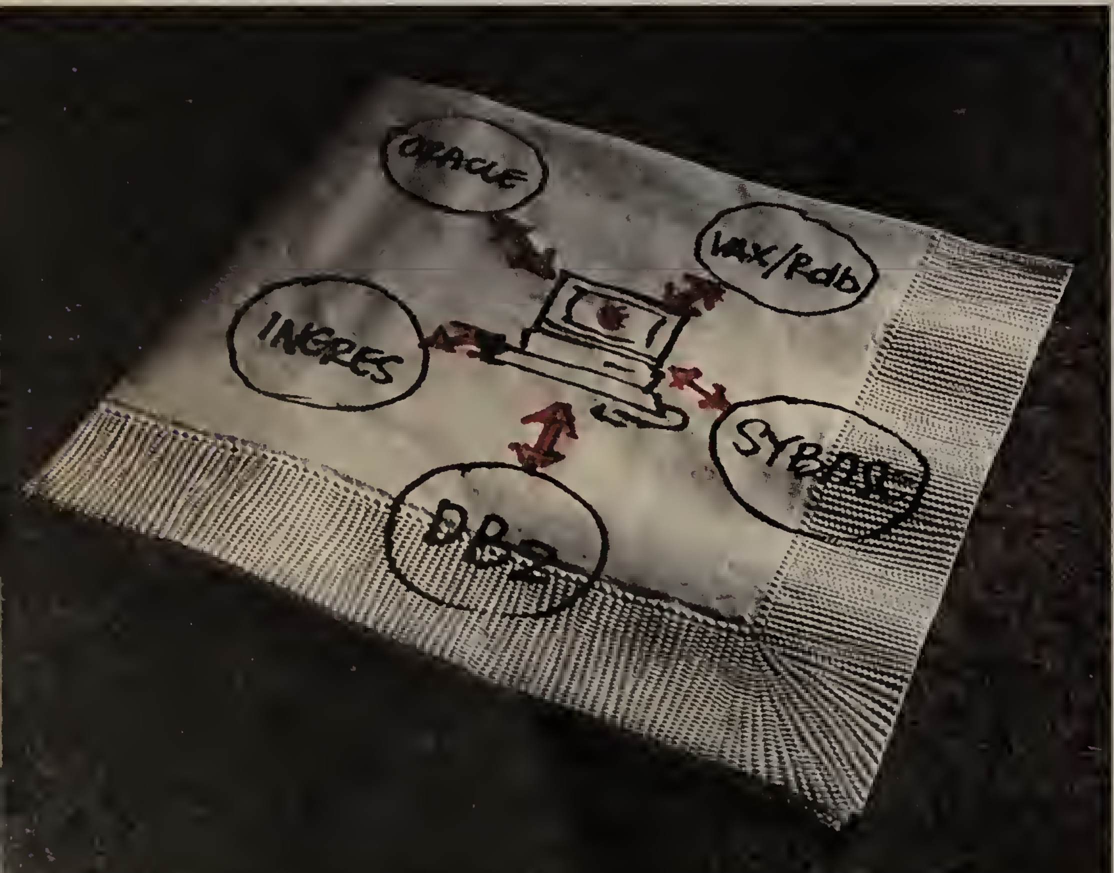
We're open

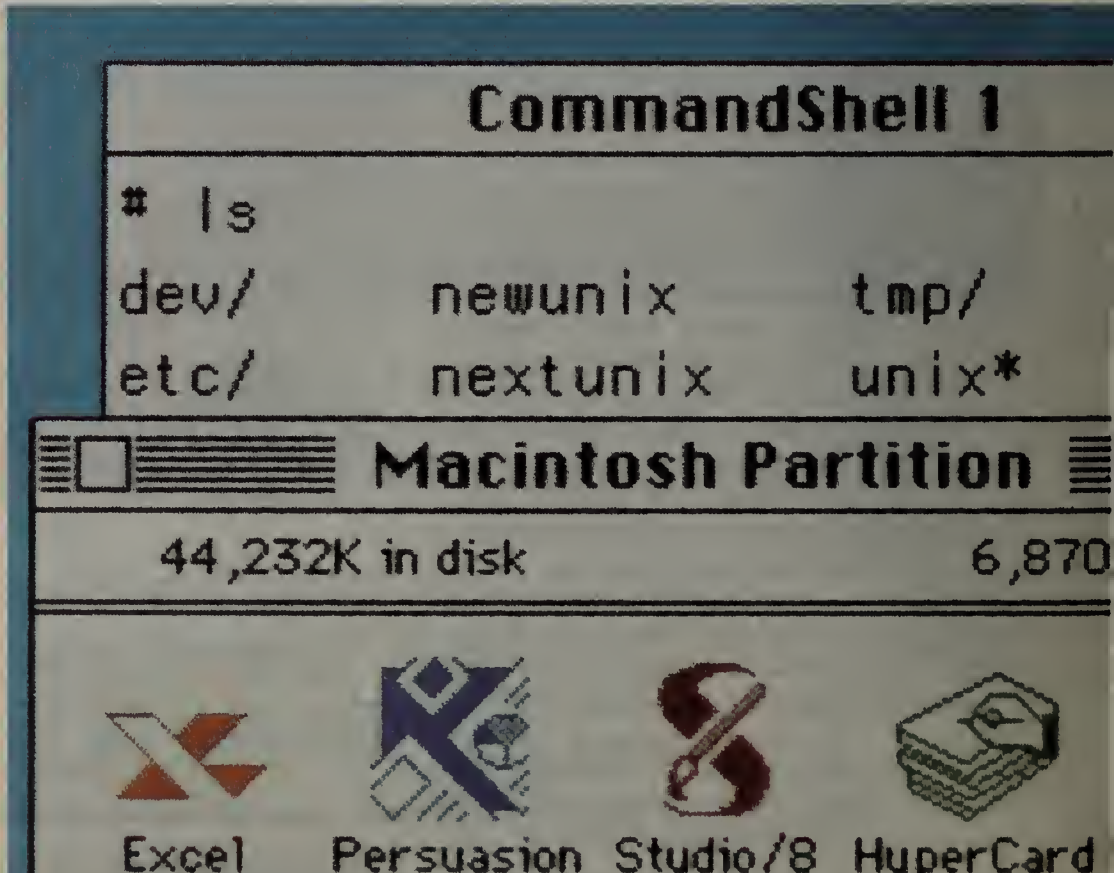


This is the Macintosh Chooser. A single point of access to a wide range of systems. The Chooser shows available network resources graphically and consistently. Just point the mouse and you're connected.

Macintosh offers an incredible range of tools for connecting with virtually any host-based environment, whether it's running SNA, TCP/IP, DECnet™, or OSI.



Apple's Data Access Language (DAL) adapts popular off-the-shelf database, spreadsheet, and data analysis software to major SQL environments. So nontechnical users can easily access remote databases.



```
# ls
dev/      newunix     tmp/
etc/      nextunix    unix*
```

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to anything.

Macintosh shares data with DOS PCs via Novell, 3Com, Banyan, and more. Macintosh reads and writes DOS files on a floppy disk. Macintosh runs DOS programs. Maybe your next DOS computer should be a Macintosh.

Information isn't much good to people who can't get to it. Macintosh sorts out the complexities of multiple computer systems and presents vast information to people at the desktop in a single, consistent way.

While diversity may make life rich and fascinating, it makes life as an IS manager something short of serene.

What is politely referred to as the "multi-vendor environment" is an amalgam of disparate hardware, incompatible operating systems, dissimilar databases, and multiple networks. Nevertheless, IS people are expected to make these all work together in perfect harmony.

But lately, a lot of people are finding the source of their solution a pleasant surprise: the Apple® Macintosh® computer.

They're finding that Macintosh comes out of the box with sophisticated networking capabilities designed right in.

That Macintosh is open to virtually any host, any file server, or any database, through any network.

That Macintosh makes the desktop the place where diverse systems come together.

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BUYER'S GUIDE

SNMP MANAGEMENT TOOLS

A shopper's bonanza

Because it is a standard for managing any vendor's device in a heterogenous network, the Simple Network Management Protocol (SNMP) has quickly attracted the interest of many users. As a result, many user organizations are likely to consider an SNMP management system as their next major net management purchase.

An SNMP management system consists of specialized software that runs on a dedicated workstation in an organization's network control center. So configured, that workstation becomes an SNMP net management station — the focal point of an SNMP-managed network.

Its role is to continually interrogate and debrief each network device containing an SNMP agent as well as provide a two-way window through which the net manager or technician can view the network and troubleshoot existing problems.

CHART • GUIDE

A Buyer's Guide chart comparing SNMP management software products and turnkey packages begins on page 44.

By late 1989, widespread user interest in SNMP made it clear that the protocol was on a fast track to success. Vendors that recognized this trend began developing SNMP management systems.

By the end of last year, more than two dozen SNMP network management systems had been announced. About four dozen different SNMP management systems are now on the market, with at least one to fit almost any network's size and budget.

As the chart that begins on page 44 shows, most SNMP management systems are software products. Only a few vendors bundle their SNMP management software in a turnkey package with station hardware.

These include AT&T Computer Systems, which optionally offers its Systems Manager software preloaded on an 80386-

(continued on page 48)

A bevy of SNMP management packages is available to fit any user's network and budget.

Mier, project head of the Network World/*AT&T Bell Laboratories SNMP Lab Test Series, is president of Mier Communications, Inc., a Princeton Junction, N.J.-based communications consultancy that is publishing special reports on SNMP.*

By EDWIN MIER

Networking.

Without fresh informat

Some say "the network is the system," but we say your network is your *business*. In fact, without a good network you could be out of business.

Unfortunately, for too many companies, networking is not working. Or, not well enough.

Often it's because computer systems once chosen to solve problems are now causing them, because they can't communicate.

To pull things together takes a broad perspective, plus real knowledge of enterprise systems. Which makes IBM an ideal networking partner, especially since we're not just committed to open, multivendor environments, we're delivering.

For example, we're now helping UCLA build

on flowing freely, companies wither and die.

a campus-wide network that will connect 15,000 people using Apple,® DEC® and IBM systems, tied together by TCP/IP and SNA protocols.

We're also a leader in OSI, with OSI offerings across all IBM platforms. And our SNA networks are open to a wide variety of non-IBM systems.

What's more, IBM's network management systems are the industry's most robust, which is why Santa Fe Railway is using IBM NetView® for automating operations and to control not just their LANs but costs as well.

You can also tie into the IBM Information Network for worldwide communications with customers and suppliers. And you can use voice-enhanced solutions like IBM CallPath™ to greatly improve customer service.

But technology aside, the point is to get information flowing more freely around your company. And it's no longer just a good idea, it's an absolute business imperative.

Networking shouldn't be done piecemeal; you have to consider all the pieces at once—no matter who made them—and IBM has the resources for helping you do that.

To learn more about IBM networking, talk with your IBM marketing rep. Or to have one call you, call us at 1 800 IBM-6676, ext. 880.

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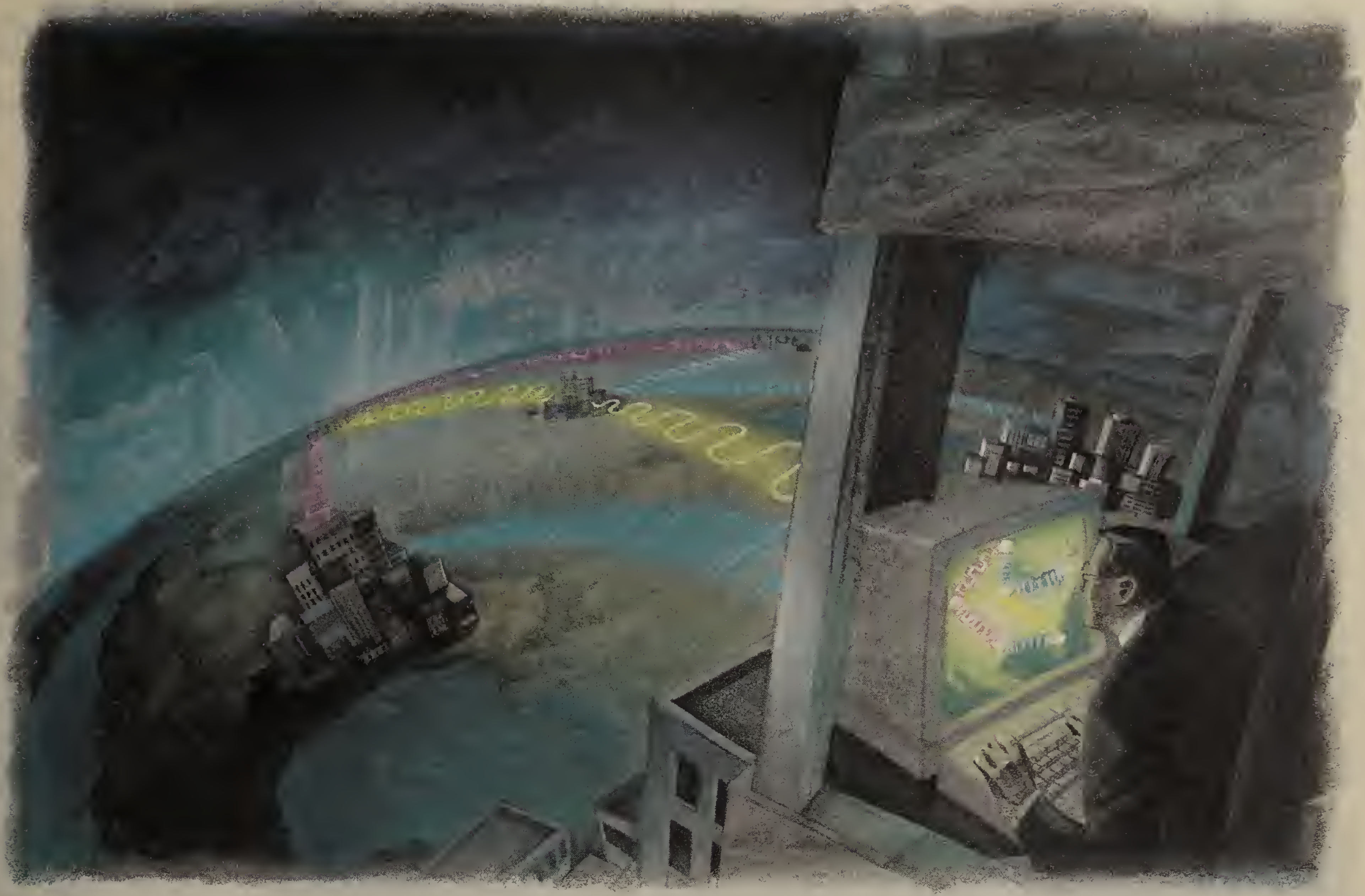
SNMP management tools (continued on page 49)

Vendor	Product	Description	Hardware platform	Operating system	User application Interface	Vendor-specific MIB support	SNMP standards and features supported	Managed device capacity	Price
Advanced Computer Communications **Santa Clara, Calif.** **(805) 963-9431**	ACS 4800 Network Management System	Software system for managing any device that implements SNMP	Sun Microsystems, Inc. Sun-3, Sun-4 or SPARCstation; 8M bytes of RAM; color monitor	SunOS Unix Release 4.1	Graphical; mouse and icons; hierarchical network map; SQL-compliant data base; API	10 vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB I; uses original Internet SMI (RFC 1065); SNMP over UDP/IP; GETs, SETs and customized TRAPs	Unlimited	$12,500 (software package only; hardware extra)
The AG Group **Walnut Creek, Calif.** **(415) 937-7900**	EtherPeek 1.3	Network analyzer software designed to send, capture and decode Ethernet packets, including SNMP; not a real-time SNMP manager	Apple Computer, Inc. Macintosh with color monitor; 2M bytes of RAM recommended; 1M bytes of disk storage	Macintosh O/S	Uses Macintosh's graphical interface; menu-driven, point-and-click; double-click short cuts	Facilities included for importing vendor-specific MIBs	Package allows user to look at and construct SNMP packets; manual construction of GETs and SETs; no TRAPs; network protocol support not included, requires MacIP software	Not software limited	$695 (software package only; hardware extra)
Alantec **Fremont, Calif.** **(415) 770-1050**	MultiLAN Manager Version 1.0	Software tool for managing vendor's products only via a third-party SNMP management station	Runs on any third-party, Unix-based SNMP management station	Unix	Unix command line; programming interface via Unix pipe or redirection facility	This software adds support for vendor's proprietary protocols and objects to an otherwise generic SNMP manager	SNMP protocol and MIB support is via the third-party management station on which this package is run (such as SunNet Manager)	Limited only by Unix sockets	$2,500 (software only; all hardware extra)
AT&T Computer Systems **Morristown, N.J.** **(800) 247-1212**	AT&T Systems Manager Version 3.4	Software system for managing any device that implements SNMP	AT&T 80386- or 80486-based system or appropriate Unix system; 16M bytes of RAM, 7.3M bytes of disk space; VGA monitor; TCP/IP and X Window System support	Unix System V Release 4.0	Graphical X Window interface with icons and point-and-shoot operation; multilayered maps; customized device icons; APIs	15 vendors' MIBs currently supported; vendor-specific MIB-importing utility included	MIB I, MIB II; supports original Internet SMI (RFC 1065) and Concise formats; object support is extensible to the ISO SMI; SNMP over UDP/IP; also supports CMOT; GETs, SETs and customized TRAP monitoring	Up to 1,000 managed agents per manager	$10,495 (software only); $28,000 (fully configured workstation)
Bell Atlantic Software Systems **Princeton, N.J.** **(609) 936-2900**	IntelliManager Services Version 1.0	Specialized software providing a bidirectional interface between SNMP management systems and IBM's NetView	Currently runs on Sun SPARCstation and IBM RISC System/6000	Unix, as appropriate for hardware platform	NetView interface to IBM operator; SNMP interface depends on SNMP management system; C language API	As supported by the SNMP management station	Allows NetView operator to issue SNMP manager GETs and SETs; communications with SNMP managers is via TCP/IP, and NetView via SNA/LU 6.2	SNMP manager-dependent	$50,000 (OEM source code license); SNMP manager and NetView systems acquired separately by user
Cabletron Systems, Inc. **Rochester, N.H.** **(603) 332-9400**	Spectrum Advanced Management System Release 1.0	Software system for generic SNMP management with concurrent support for CMIP and other protocols; gateways to IBM's NetView and AT&T's Accumaster	Currently Sun-4 or SPARCstation; being ported to IBM RISC System/6000, DEC and other platforms; 16M bytes of RAM, 300M bytes of disk storage; color monitor	Unix (as appropriate for hardware platform) with X Window and OSF/Motif support	Graphical interface under X Window, featuring such models of devices, network topology, cabling, alarms, events and locations; APIs per Unix, X Window and OSF/Motif	Yes, supports private SNMP MIB extensions; several vendors' MIBs are now being incorporated; an on-line editor is used to define new devices and variables	MIB I, MIB II; SNMP and CMIP protocol support; Set capabilities under development	Currently, about 3,000 devices per system	$50,000 (software, including data base manager and multiprotocol support); $5,000 (graphical user interface); $1,000 to $5,000 (individual vendor support packages); all hardware extra
	Remote LANVIEW/ Windows	PC-based software system for managing any device that implements SNMP or older vendor devices via proprietary protocol	286/386-based PC; 4M bytes of extended memory, 3M bytes of disk space; color/VGA monitor	DOS 3.1 or later and Microsoft Corp. Windows 3.0	Windows-based user interface; no programming interfaces	10 vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB I; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs and SETs	400 nodes	$4,995 (software package only; PC hardware extra)
	Remote LANVIEW for SunNet Manager	Software extension to Sun's SunNet Manager package for managing Cabletron's equipment; works with Remote LANVIEW/Windows (see above entry for details on LANVIEW/Windows)	Runs on SunNet Manager SNMP management platform; Sun SPARCstation; 12M bytes of RAM, hard disk; color monitor	SunOS 4.1 with OpenWindows Version 2	Windows-based user interface	For vendor-specific MIBs supported by this package; vendor-specific MIB-importing utilities included	MIB I and MIB II, in conjunction with SunNet Manager; Internet SMI (RFC 1155); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	400 nodes	$10,995 (this software package only; SunNet Manager software and hardware platform extra), also requires Remote LANVIEW/Windows ($4,995)
Cisco Systems, Inc. **Menlo Park, Calif.** **(415) 326-1941**	NetCentral Station Release 1.2	Software system for managing any device that implements SNMP	Sun-3 or SPARCstation (1, 1+, 2); 12M bytes of RAM, 200M bytes of disk storage; color monitor	SunOS Version 4.0.3 or later with X Window system	Graphical user interface via X Window or Sun OpenWindows; point-and-click querying; integrated relational data base; SQL programming interface	3 vendors' MIBs supported; vendor-specific MIB-importing utilities included	MIB I, MIB II; Internet SMI (RFC 1155); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	No software constraint	$14,000 (software only, including DBMS; hardware extra)
Codex Corp. **Mansfield, Mass.** **(508) 261-4000**	9800/SNMP Processor v1.0	Generic SNMP management software; option that loads onto vendor's 9850 management system; for managing any device that implements SNMP	386-based, 33-MHz processor; 8M bytes of RAM, 150M-byte disk, 150M-byte tape	Based on Unix System V Release 4	Graphical representation of SNMP network device topology, and a Digital Equipment Corp. VT-100 menu and windowing system; API (syntax similar to Pascal and C languages)	2 vendors' MIBs supported; vendor-specific MIB-importing utilities included	MIB I, MIB II; Internet SMI (RFC 1155); SNMP over UDP/IP, as well as Telnet; GETs, SETs and customized TRAP monitoring	About 500 agent devices	$9,950 for SNMP software (an option to vendor's 9850 NMS, which is required); other related SNMP software options $3,000 to $4,000
David Systems, Inc. **Sunnyvale, Calif.** **(408) 720-8000**	ExpressView Release 1.0	Software system for managing any device that implements SNMP	386/486-based PC or IBM PS/2; 4M bytes of RAM, 20M bytes of disk storage; VGA display and mouse	DOS with Windows 3.0	Windows-based, mouse-driven, graphical user interface; no programming interface	Only vendor's private MIB supported	MIB I; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs and SETs	About 500	$1,495

API = Application program interface
CMIP = Common Management Information Protocol
CMOT = CMIP over TCP/IP
EGA = Enhanced graphics adapter
IPX = Internetwork Packet Exchange
ISO = International Standards Organization
MIB = Management Information Base
NMS = Network management system
ODS = Optical Data Systems
OSF = Open Software Foundation
RFC = Request For Comments
RISC = Reduced Instruction Set Computer
SCO = The Santa Cruz Operation, Inc.
SMI = Structure of Management Information
SMT = Station management
SNMP = Simple Network Management Protocol
UDP = User Datagram Protocol
VGA = Video graphics adapter

This chart includes a representative selection of vendors of SNMP management tools. Some vendors not included offer a full range of competitive products.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.



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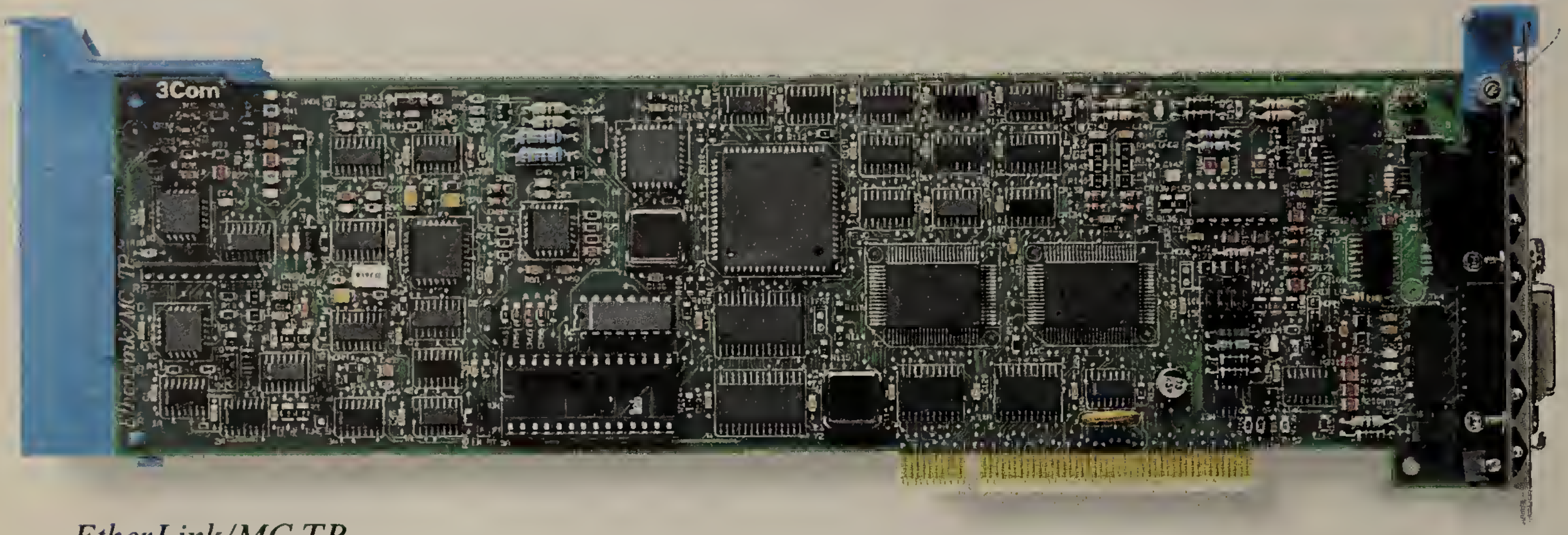
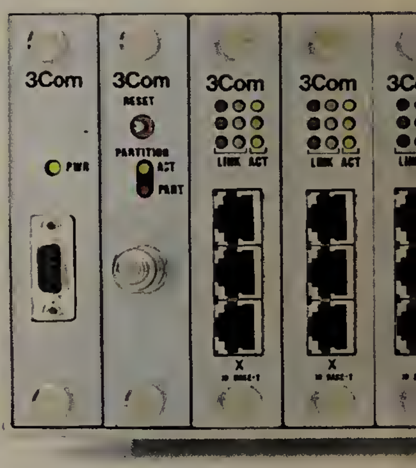
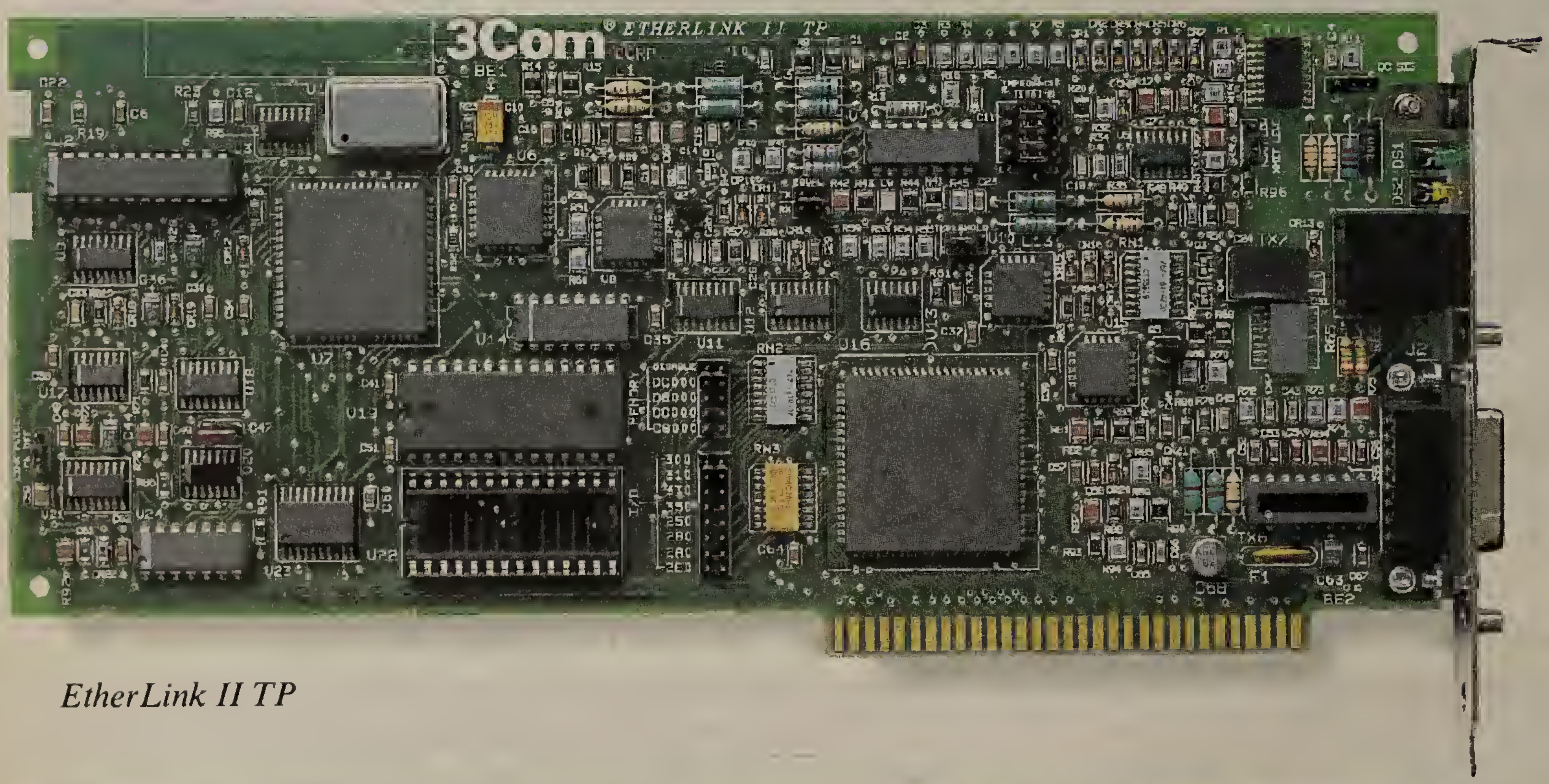
Every twisted question



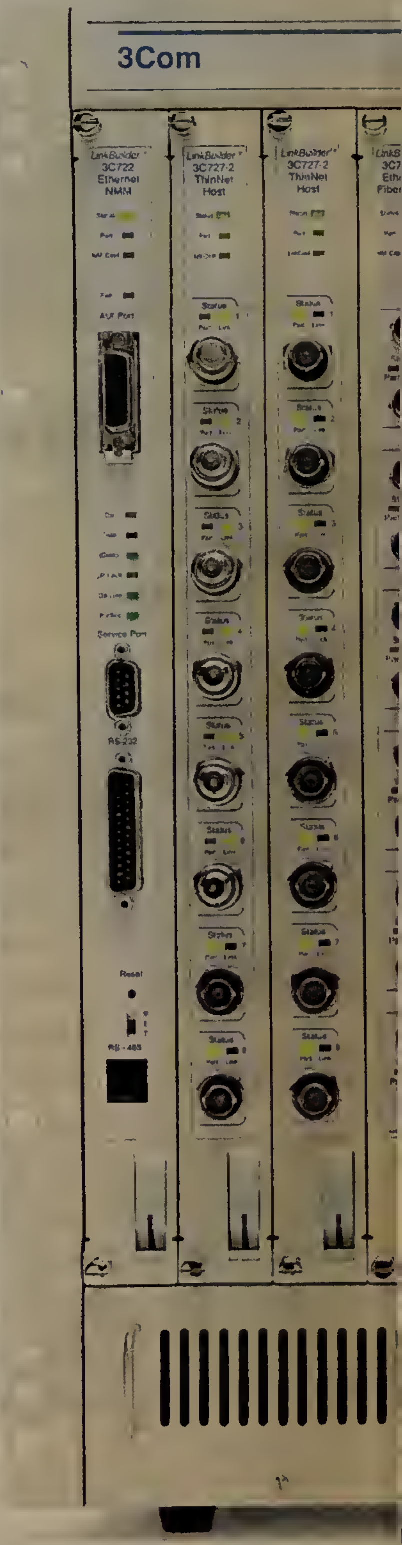
EtherLink/MC TP



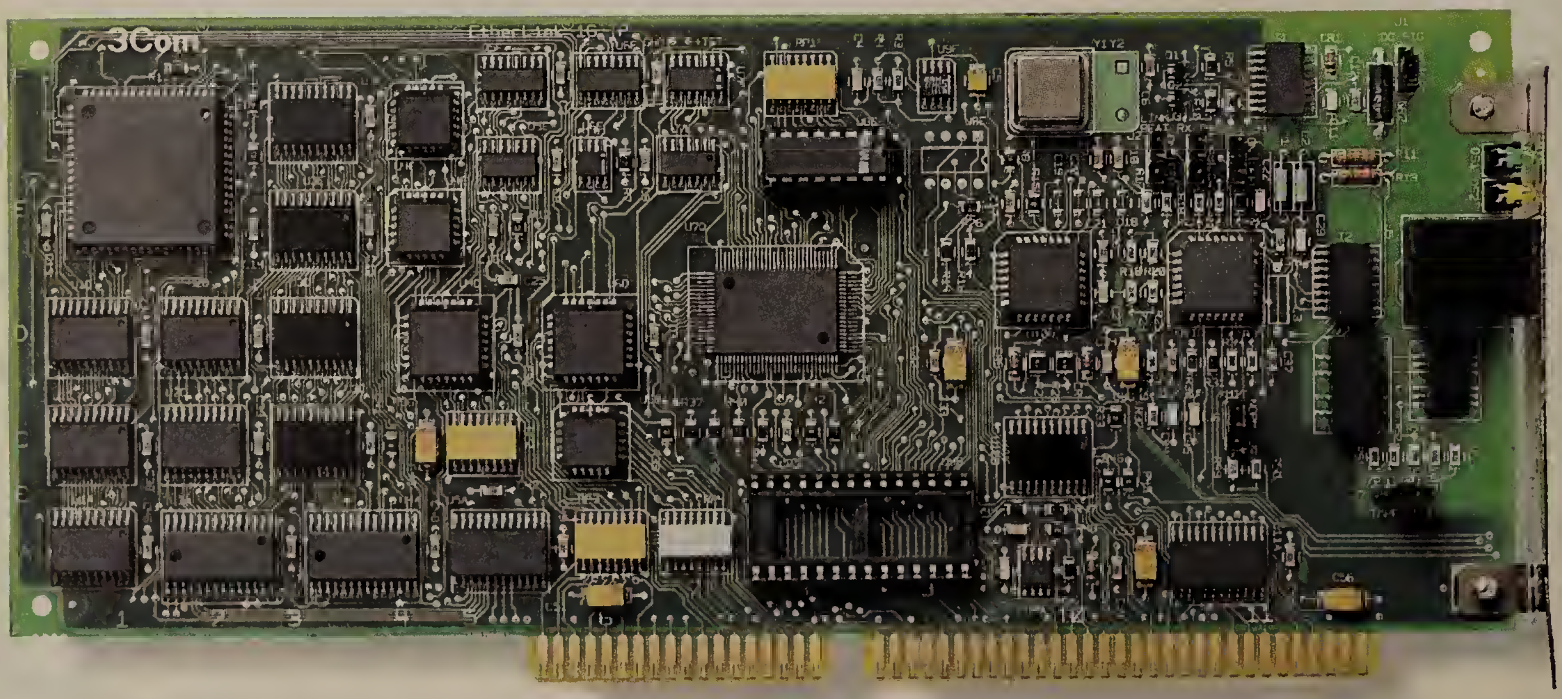
MultiConnect



EtherLink II TP


3Com
LinkBuilder 3C722 Ethernet NMM
LinkBuilder 3C727-2 ThinNet Host

EtherLink 16 TP



LinkBuilder

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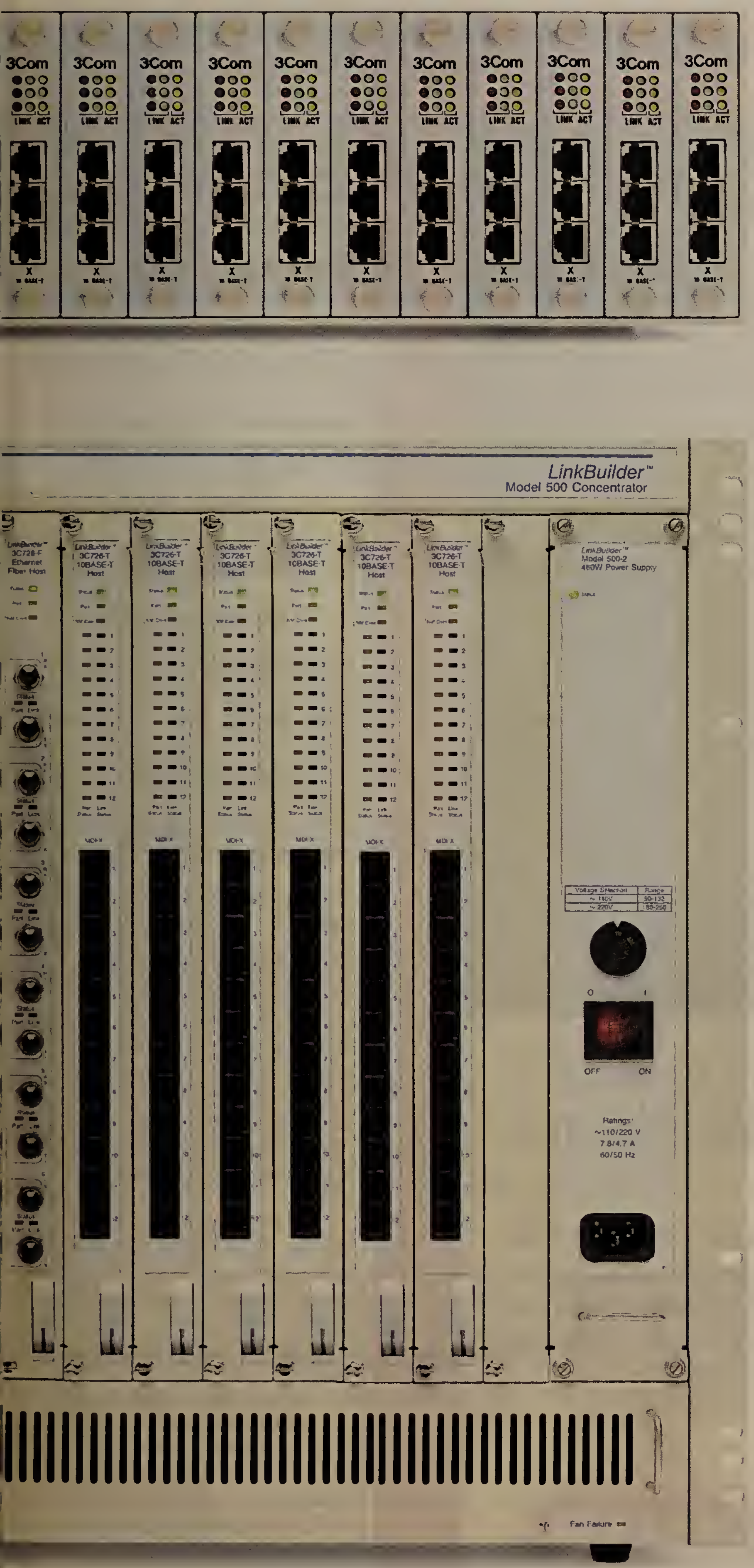
deserves a simple answer.


3Com
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Model 500 Concentrator
LinkBuilder™ 3C726-T 10BASE-T Host
LinkBuilder™ Model 500-2 480W Power Supply
Fan Failure

Have you noticed that standards designed to simplify your life, often complicate it instead?

That's the way it is with twisted-pair wiring. In the long run, managing your network improves. But in the short run – implementation – that's where the worries come in.

Which is where 3Com comes in, too. 3Com® adapters and hubs let you adopt twisted-pair wiring without adopting worries about compatibility, flexibility and reliability.

3Com adapters are compatible with every major network operating system as well as all your PC platforms. And they are compatible with your pre-standard 10BASE-T hubs. So the investments you've made already are protected.

What's more, all 3Com adapters are network manageable. And you'll find installing them is simple. They come with a complete set of diagnostic tools to guide you every step of the way.

And once installed, they stay installed. All 3Com EtherLink® adapters come with a limited lifetime warranty. But with 2.5 million adapters shipped, and a mean time between failures of over 70 years, it's a safe bet you'll never have to call for help.

3Com hubs are equally worry-free. You never have to worry about accommodating different media on the same network. With 3Com hubs you can mix and match 10BASE-T with coax or fiber-optic modules. You can also choose 3Com hubs that are network manageable.

What's more, when you put 3Com hubs and adapters together, you gain even more peace of mind. They not only work together seamlessly, when you use the MultiConnect® model hub your data travels farther than with other 10BASE-T hubs.

So why worry? Just call **1-800-NET-3Com** Dept. D6593 for your free brochure "Worry-Free 10BASE-T."

Even your most twisted questions have a simple answer.

3Com®

We network more types of systems
to more types of systems.™

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(continued from page 41)

based Unix platform, and Silicon Graphics, Inc.

Although priced separately, Silicon Graphics' Spectrum SNMP management software is designed to run on the vendor's own Unix-based workstation, which features a high-resolution, color-graphics display.

Because the Internet community that spawned SNMP is largely Unix-oriented, it comes as no surprise that the majority of SNMP management packages have been written to run in Unix environments.

However, user organizations lacking Unix experience or hesitant to get into Unix for the first time are not excluded because SNMP management packages are also available that run on DOS, DOS with Microsoft Corp.'s Windows, Digital Equipment Corp.'s VMS, IBM's OS/2 and several other software operating environments.

While the different software packages vary significantly in some key aspects, such as user interface and required memory, all SNMP management systems must necessarily perform the same set of basic functions. These include, at a minimum, the ability to issue GET and SET commands for the object variables contained in the current SNMP Management Information Base directory (MIB-I), as well as the ability to receive and recognize Traps, which are SNMP agent device-generated alarm messages that any managed device on the network might issue.

For users who need only these functions, any of several dozen SNMP management packages could be used — almost interchangeably — to perform rudimentary management of a mixed-vendor SNMP network. The different options and extended features distinguish these packages from each other.

This universality of SNMP operation is the main reason the protocol is so popular among users. SNMP is truly novel in the networking industry, especially when compared with such proprietary network management products as IBM's NetView (see "SNMP vs. NetView," page 54).

SNMP shining on Sun

Most net management centers today are cluttered with personal computers and dumb terminals. Each is usually hooked into a particular, vendor-proprietary management subsystem, which provides the network manager with access to some discrete aspect of the network's overall operation.

All SNMP management systems must necessarily perform the same set of basic functions.

▲▲▲

High-powered, engineering-type workstations, which feature high-resolution, X Window System-based color displays — such as Sun Microsystems, Inc.'s SPARCstation series — are not traditionally part of this landscape.

But this situation is likely to change, if the repertoire of currently available SNMP management packages is any indication of what is to come.

More than half of the packages profiled in the chart were created to run on a Sun workstation under SunOS, Sun's version of Unix. Most of these packages make use of the X Window System or some equivalent graphical user interface, which usually necessitates a high-resolution display. Many of the SNMP management packages require a color monitor, while others only recommend one.

Sun has achieved a coup by positioning its workstations to become the de facto standard hardware platform for SNMP network management stations. The Sun stations, many SNMP software suppliers agree, are ideally suited

(continued on page 54)

Using a LANtern to get a complete view of your network can make you look a lot brighter.

Here's how to shed some light on your network. The LANtern™ network monitor. It provides a complete, non-intrusive view of all network activity. It can track all devices on any Ethernet network, noting common problems. So it helps you improve performance, prevent downtime, and plan for efficient growth.

Use it with Novell's LANtern Services Manager, a Windows-based console that provides a graphic view of your entire network. Or, since LANtern is the de facto industry standard SNMP monitor, you can choose a management console from over 15 third-party vendors, including SUN, DEC, NCR, and Hewlett-Packard.

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SNMP management tools (continued on page 50)

Vendor	Product	Description	Hardware platform	Operating system	User application interface	Vendor-specific MIB support	SNMP standards and features supported	Managed device capacity	Price
Digital Analysis Corp. Reston, Va. (703) 476-5900	EYE*NODE Release 1.3	Unix-based software system for managing any device that implements SNMP; forwards Traps to IBM NetView	Several Unix-based: Sun SPARCstation, 386 PC, Data General Corp. Aviion, others; 20M bytes of RAM, 400M-byte disk; color monitor	Unix adaptation for hardware platform (SunOS, SCO Unix, DG/UX)	Graphical user interface based on X Window with OSF/Motif; SQL programming interface, other APIs optional	20-plus vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB I; uses Internet SMI (RFC 1155); SNMP over UDP/IP; SNA/SDLC for Trap forwarding to NetView; asynchronous links to SNMP Proxies; GETs, SETs and customized TRAP monitoring	100-plus devices	$14,995 (base software system); $5,000 NetView interface; $50,000 (typical configuration, includes training and customization)
Digital Equipment Corp. Maynard, Mass. (800) 344-4825	DECmcc Director V1.1	Software system for managing any device that implements SNMP	DEC VAX; 16M to 32M bytes of RAM (small to large network), 35M bytes of disk storage; color X Window terminal recommended	VMS	Iconic map and pull-down option menu interface, a command line interface and/or a forms interface; user-editable script procedure; published API	Not in this release	MIB I; uses Internet SMI (RFC 1065 and RFC 1155 versions supported); SNMP over UDP/IP, other protocols may be added through API; GETs and SETs	About 1,000	$17,690 (flat price for software only; all VAX hardware extra)
	DEC Management Station for Ultrix Version 1.0	Software system for managing any device that implements SNMP; DECnet Phase IV also supported	Digital RISC or VAX; 16M to 24M bytes of RAM, 277M bytes of disk storage; color X Window terminal	Ultrix	Iconic map and pull-down option menu interface; no API in current release	About 12 vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB II; uses Internet SMI (RFC 1065 and RFC 1155 versions supported); SNMP over UDP/IP; a CMOT version available by special request; GETs, SETs and customized TRAP monitoring	More than 14,000 agents	$7,070 (flat price for software only; all hardware extra)
FiberCom, Inc. Roanoke, Va. (703) 342-6700	ViewMaster+ R2.1	Software system for managing any device that implements SNMP	Sun SPARCstation and compatibles, or DEC 3100; 16M bytes of RAM, 760M bytes of disk storage	SunOS 4.3 or later, with Sun OpenWindows or X Window (Version 11 Release 4)	Icon-driven, Motif-based graphical user interface; fourth-generation language programming interface; optional relational DBMS	9 vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB I, MIB II; supports Internet SMI (RFC 1155), Internet Concise MIB format (RFC 1212) SNMP over UDP/IP; GETs, SETs and customized TRAPs	Available disk space is only limitation	$15,000 (software package only; all hardware extra); $5,000 optional DBMS
Fibermux Corp. Chatsworth, Calif. (818) 709-6000	LightWatch Network Management Software: Unix or DOS versions	Software packages for managing vendor's Crossbow LAN cabling hub via SNMP	Unix version: Sun SPARCstation, 8M to 12M bytes of RAM, 10M bytes of disk storage, color monitor; DOS version: 386 PC, 2M bytes of RAM, 4M bytes of disk storage, VGA monitor	SunOS with OpenWindows or X Window, or DOS 3.3 or later	Graphical user interface; topological graphics displayed and updated in real time; point-and-click via mouse; no APIs	Only vendor's private MIB currently supported; a third-party package is available for loading vendor-specific MIBs	This software adds support for only vendor's MIB; other SNMP formats supported via third-party management software; GETs, SETs and TRAPs	About 100 hubs	$4,500 for Unix version, $2,000 for DOS version (software package only; all hardware extra)
FTP Software, Inc. Wakefield, Mass. (617) 246-0900	PC/SNMP Tools V.1.01	Software system for managing any device that implements SNMP	PC/AT, PS/2 or compatibles; 640K bytes of RAM; EGA card (if graph functions are used)	DOS 3.1 or later (libraries for software are written in Microsoft C Version 5.1)	Command line interface uses host names, English descriptors and single-letter codes to access options; graph program included	No vendor-specific MIBs included or available; however, software offers access to other MIBs	MIB I; uses original Internet SMI (RFC 1065); SNMP over UDP/IP; GETs, SETs and customized TRAPs	Full monitoring of up to 80 devices, limited monitoring of up to several hundred	$300 per copy (software package only; all hardware extra)
Gandalf Data, Inc. Nepean, Ontario (613) 723-6500	Access Manager (Enterprise Edition and Domain Edition) Release 1	Software systems for managing any device that implements SNMP	Sun IPC workstation; 12M to 24M bytes of RAM, 200M bytes of hard disk; color monitor recommended	SunOS 4.1 or later with X Window and OSF/Motif support	Icon-based graphical user interface; help screens; program interface via X Window; Unix/C program integration via menu system	8 vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB I, MIB II; uses Internet SMI (RFC 1155); also supports ISO SMI format; SNMP over UDP/IP or CMIP over TCP/IP; GETs and SETs	250 (Domain Edition), unlimited (Enterprise Edition with higher performance platform)	$5,000 for Domain Edition; $12,000 for Enterprise Edition (software only; all hardware extra)
Hewlett-Packard Co. Colorado Networks Division Fort Collins, Colo. (303) 229-3800	OpenView Network Node Manager 2.0	Software system for managing any device that implements SNMP	HP 9000, Sun SPARCstation or IBM RISC System/6000; 8M to 16M bytes of RAM, 20M bytes of disk storage; color display	Unix (HP-UX 7.0/8.0, SunOS 4.1, or IBM AIX); X Window or equivalent support	Motif-based graphical user interface; pull-down menus, actions performed by selecting node on map; no API, but applications integrated via menu, dialog-box interface	18 vendors' MIBs currently supported, vendor-specific MIB-importing utilities included	MIB I, MIB II, supports Internet SMI (RFC 1155), and Concise MIB format (RFC 1212); SNMP over UDP/IP; Telnet also supported; GETs, SETs and customized TRAP monitoring	Designed for up to 500 nodes but can manage up to about 2,000	$15,000 (software package only; all hardware extra)
Hewlett-Packard Co. Roseville, Calif. (800) 752-0900	OpenView Hub Manager (28686C) and Bridge Manager (28653C)	Software system for managing any SNMP device with special features for managing vendor's hubs or bridges	286/386/486 PC; 2M bytes of extended memory, 20M bytes of disk storage; VGA monitor	DOS and Windows 3.0	Windows-based graphical user interface; automatic discovery of network devices; network map generation; real-time graphing	4 vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB II; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	500 devices	$1,499 for Hub Manager, $1,999 for Bridge Manager (software package only; all hardware extra)
	OpenView Interconnect Manager (27360A)	Software system for managing any device that implements SNMP	HP 9000 or Sun SPARCstation; 16M bytes of RAM, 300M bytes of disk storage; bit-mapped display	HP-UX or SunOS, OSF/Motif support	OSF/Motif-based graphical user interface	4 vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB II; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	Thousands	$17,000 (software package only; all hardware extra)
Hughes LAN Systems, Inc. Mountain View, Calif. (415) 966-7300	9100 Network Management Center V4.0	Software system for managing any device that implements SNMP	Sun-4 workstation; 12M bytes of RAM, 200M bytes of disk storage; color monitor	SunOS 4.1.1	Icon-based graphical user interface; customized descriptors; automatic diagnosis of alarms; APIs including SQL interface	10 vendors' MIBs currently supported; vendor-specific MIB-importing utilities included	MIB I, MIB II; supports Internet SMI (RFC 1155) and Concise MIB format (RFC 1212); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	Up to 25,000	$14,950 (software package only; all hardware extra)

API = Application program interface
CMIP = Common Management Information Protocol
CMOT = CMIP over TCP/IP
EGA = Enhanced graphics adapter
IPX = Internetwork Packet Exchange
ISO = International Standards Organization
MIB = Management Information Base
NMS = Network management system
ODS = Optical Data Systems
OSF = Open Software Foundation
RFC = Request For Comments
RISC = Reduced Instruction Set Computer
SCO = The Santa Cruz Operation, Inc.
SMI = Structure of Management Information
SMT = Station management
SNMP = Simple Network Management Protocol
UDP = User Datagram Protocol
VGA = Video graphics adapter

This chart includes a representative selection of vendors of SNMP management tools. Some vendors not included offer a full range of competitive products.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

SNMP management tools (continued on page 52)

Vendor	Product	Description	Hardware platform	Operating system	User application interface	Vendor-specific MIB support	SNMP standards and features supported	Managed device capacity	Price
Microcom, Inc. **Norwood, Mass.** **(617) 551-1000**	Microcom Management Station Version 3.0	Software and LAN adapter enabling PC station to manage Microcom LAN bridge devices via SNMP	386 or higher, AT-bus PC; 1M byte of RAM, 20M bytes of disk storage; EGA display recommended	DOS 3.1 or later	Menu-driven interface; on-line help; status line for network alarms; no program interfaces	Manages vendor's bridge products only	MIB I; supports Internet SMI formats (RFC 1065 and RFC 1155); SNMP over LAN network/transport protocol (based on user configuration); GETs and SETs	Up to 500 of vendor's bridges	$3,399 software and Ethernet adapter; $3.699 software and token-ring adapter
Micro Technology, Inc. **Anaheim, Calif.** **(714) 970-0300**	LANCE Release 2.2	Software system for managing any device that implements SNMP	Sun SPARCstation, VAX station 3100 or 5000; 16M bytes of RAM, 35M bytes of disk storage; color monitor	SunOS, DEC RISC, Ultrix or VMS	X Window/Motif-based graphical user interface; iconic map display; real-time graphing of network statistics; program integration via Unix shell, library routines	Over 24 vendors' MIBs currently supported, including many draft MIB standards (T-1, DS3); includes vendor-specific MIB-importing utilities	MIB I, MIB II; supports Internet SMI (RFC 1155), and Concise MIB format (RFC 1212); SNMP over UDP/IP; Telnet also supported; GETs, SETs and customized TRAP monitoring	Unlimited	$18,500 (software package only; all hardware extra)
NCR Corp. **Columbia, S.C.** **(803) 796-9740**	NCRNet Manager Version 3.0	Software module that adds SNMP management capability to vendor's OSI/CMIP-based management system	NCR System 3000 or Tower with 8M bytes of RAM, 16M bytes of disk space; a PC is required for use as an operator console	Management system runs Unix System V Release 4; PC console runs DOS with Windows 3.0	Windows-based graphical user interface	1 third-party vendor's MIB shipped with software; vendor-specific MIB-importing utilities included	MIB I, MIB II; supports Internet SMI (RFC 1155) and Concise MIB format (RFC 1212); SNMP over UDP/IP; concurrently supports CMIP/Common Management Information Services for OSI device management; GETs and SETs	300 per workstation	$1,000 (SNMP-support software package only; all hardware extra)
Network Equipment Technologies, Inc. **Redwood, Calif.** **(415) 366-4400**	Series 5000 Network Management System	Software system oriented toward WAN management of devices that implement SNMP	Sun-3 or SPARCstation; 16M bytes of RAM, 669M bytes of disk storage; color monitor	SunOS 4.1.1	Graphical user interface; graphical display of network links, nodes and modules; script language for managing T-1 multiplexers	Support of third-party vendors' private MIBs not indicated; system supports link with AT&T Accumaster	SNMP over UDP/IP; MIB and SMI support not specified	128 devices	$18,000 to $70,000, depending on configuration (software package only; all hardware extra)
Network Managers, Ltd. **Guildford, U.K.** **(44) 483-303223**	NMC 3000 Network Manager Version 1.2	Software system (2 versions) for managing SNMP devices via various LAN and WAN network- and transport-layer protocols	Sun SPARCstation 1+ and 2, IPC; or 386/486-based PC; 16M bytes of RAM, 200M bytes of disk storage; color monitor	SunOS with X Window system and OSF/Motif support; or SCO Open Desktop Unix (for 386/486)	Graphical user interface (varies depending on hardware/software platform); APIs included for integration of new management protocols	Over a dozen vendors' MIBs currently supported, plus draft MIB standard for hubs; vendor-specfic MIB-importing utilities included	MIB I, MIB II and draft Hub MIB; uses Internet SMI (RFC 1155); SNMP over UDP/IP, MAP LANs or NetWare IPX (4Q '91); CMIP support planned; GETs, SETs and customized TRAP monitoring	250 devices	$4,850 for base software system; $1,000 to $1,500 per protocol; $650 to $2,500 per vendor-specific module
Newbridge Networks, Inc. **Herndon, Va.** **(703) 834-3600**	8001 LAN Manager Release 1.0 (available 3Q '91)	Software system for fully managing vendor's bridges and routers via SNMP, and other SNMP devices via Trap collection only	PC/AT or compatible; 640K bytes of RAM, 20M bytes of disk storage	DOS 3.3 or later	Menu-based operator interface; no programming interfaces	Currently only vendor's devices are fully supported via SNMP	MIB I; supports Internet SMI (RFC 1155) and Concise MIB format (RFC 1212); SNMP over UDP/IP; GETs, SETs and TRAPs	100 devices	$1,000 (software only; all hardware extra)
	4602 Intelligent NetworkStation and 5638 SNMP Manager Release 4.0	Software packages for managing vendor's products (4602 NetStation) or any device that implements SNMP (5638 Manager)	Sun-4, SPARCstation 1, 1+, 2 or IPC; 16M to 24M bytes of RAM, 207M-byte disk; color monitor and mouse	SunOS 4.1.1	SunView-based, mouse-driven, graphical user interface; optional command line for some features; no programming interfaces	5 vendors' MIBs currently supported (by 5638 Manager); vendor-specfic MIB-importing utilities included	MIB I; supports Internet SMI (RFC 1155) and Concise MIB format (RFC 1212); SNMP over UDP/IP; GETs, SETs and TRAPs	1,000 devices	$10,000 (software only; all hardware extra)
Novell, Inc. **Network Analysis Products Division** **San Jose, Calif.** **(408) 473-8333**	LANtern Network Monitor	Software system that collects management data from Ethernet devices and transmits data to a management console via SNMP	386 or higher PC; 4M bytes of RAM, 20M bytes of disk storage	DOS 3.1 or later	Depends on SNMP management console; see LANtern Services Manager for management application and interface software from vendor	Only Novell vendor-specific MIB supported; no vendor-specific MIB-importing facilities	MIB I; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs, SETs and TRAPs	No software limitation	$2,495 (monitors up to 32 devices); $4,495 (umlimited support); software only, all hardware extra
	LANtern Services Manager	Software package that provides management application and graphical interface for LANtern Network Monitor	386 or higher PC; 4M bytes of RAM, 20M bytes of disk storage; VGA monitor (color recommended)	DOS 3.1 or later with Windows 3.0	Windows-based graphical user interface; LANtern data accessible via Btrieve interface	Only Novell vendor-specific MIB supported; no vendor-specific MIB-importing facilities	MIB I; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs, SETs and TRAPs	No software limitation	$4,995 (software only; all hardware extra)
Optical Data Systems, Inc. **Richardson, Texas** **(214) 234-6400**	ODS 591/592 SNMP Manager	Software system that manages any SNMP device, via inband (ODS 591) and/or proprietary out-of-band technique (ODS 592)	PC or compatible; 640K bytes of RAM (2M byte recommended); VGA monitor recommended; mouse	DOS with Windows support	Mouse-driven, graphical, Windows interface with pull-down menus; no programming interface	Only ODS vendor-specific MIB currently supported; vendor-specific MIB-importing utilities included	MIB I, MIB II; uses Internet SMI (RFC-1155); SNMP over UDP/IP, as well as proprietary out-of-band protocol; GETs, SETs and customized TRAP monitoring	Limited by PC's memory and CPU speed	$3,115 to $3,900 (software only; all hardware extra)
Proteon, Inc. **Westborough, Mass.** **(508) 898-2800**	OverVIEW v2.0	Software system for managing any device that implements SNMP	286/386-based PC or compatible; 1M byte of RAM, hard disk; VGA/EGA color monitor; mouse	DOS	Hierarchical graphical network map with color-coded icons; a scripting language is provided	None	MIB I; uses Internet SMI (RFC-1155); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	256 devices and 1,024 interfaces	$6,995 (software only; all hardware extra)

API = Application program interface
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CMOT = CMIP over TCP/IP
EGA = Enhanced graphics adapter
IPX = Internetwork Packet Exchange
ISO = International Standards Organization
MIB = Management Information Base
NMS = Network management system
ODS = Optical Data Systems

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This chart includes a representative selection of vendors of SNMP management tools. Some vendors not included offer a full range of competitive products.

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SNMP management tools (continued on page 58)

Vendor	Product	Description	Hardware platform	Operating system	User application interface	Vendor-specific MIB support	SNMP standards and features supported	Managed device capacity	Price
Racal InterLan, Inc. **Boxborough, Mass.** **(508) 263-9929**	Roll Call Version 1.1	Software system for managing LAN-based PCs, which run vendor's SNMP Proxy agent software	386-based PC; 4M bytes of RAM, hard disk; color monitor recommended	DOS with Windows 3.X	Includes a 10K-byte SNMP Proxy agent, which loads on each managed PC; Windows-based interface on manager PC; no API	Vendor's MIB extensions only; no facilities for third-party MIB importing	MIB I; uses Internet SMI; SNMP over UDP/IP and/or Novell IPX protocol; GETs and SETs	Designed for 200 nodes but will support more	$995 (software only; all hardware extra)
	LCX (LAN CentralExpress) Version 1.0	Software system for managing any device that implements SNMP	Sun IPC workstation; 12M bytes of RAM, 200M bytes of disk storage, tape drive; color monitor	SunOS 4.1.1 and SunNet Manager Release 1.1. X Window and Open Look support	X Window-based graphical user interface; graphic presentation of network statistics; no APIs specified	Third-party vendor MIB support not specified; facilities for third-party MIB importing included	MIB II; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	2,500	$6,495 (software only; all hardware extra)
The RAD Group (RAD Network Devices, Inc. and Lannet Data Communications, Inc.) **Huntington Beach, Calif.** **(714) 891-1964**	MultiMan 386, Version 2.0	Software system for managing any device that implements SNMP, as well as vendor's Remote Internetwork Management management system (non-SNMP)	386 PC; 12M bytes of RAM, 80M bytes of disk storage; VGA monitor	Interactive Systems' Unix, X Window/Motif support	Graphical user interface; icons represent network elements; topology maps, video images of hubs; pull-down menus for function selection; SQL programming interface	Vendor's private MIBs included with system; facilities for third-party MIB importing included	MIB I, MIB II; uses Internet SMI (RFC 1155); SNMP over LANs (WAN support planned for 3Q '91); GETs, SETs and customized TRAP monitoring	256 agents	$3,995 (software only; all hardware extra); includes RAD Network Devices or Lannet module, $1,950 extra for both modules
	MultiMan (SPARCstation version)	Software system for managing any device that implements SNMP	Sun-4, SPARCstation; 12M to 16M bytes of RAM, 80M to 100M bytes of disk storage	SunOS with X Window and OSF/Motif support	Graphical user interface; icons represent network elements; topology maps, video images of hubs; pull-down menus for function selection; SQL programming interface	Vendor's private MIBs included with system; facilities for third-party MIB importing included	MIB I, MIB II; uses Internet SMI (RFC 1155); SNMP over LANs (WAN support planned for 3Q '91); GETs, SETs and customized TRAP monitoring	256 agents	$5,950 (software only; all hardware extra); includes RAD Network Devices or Lannet module, $1,950 extra for both modules
Retix **Santa Monica, Calif.** **(213) 399-2200**	5025 Network Management Center	Software system for managing any device that implements SNMP	Sun SPARCstation; 8M bytes of RAM; 207M bytes of disk storage; color display	SunOS and SunNet Manager; X Window support	X Window-based graphical user interface; program interface via SunNet Manager system	Support of third-party vendors' private MIBs not indicated	SNMP over UDP/IP; Telnet also supported; SMI format and other SNMP features not specified	Dependent on platform	$12,000 for software, including SunNet Manager license (all hardware extra)
Silicon Graphics, Inc. **Mountain View, Calif.** **(415) 960-1980**	Spectrum 1.0	Management station (hardware and software) for managing any device that implements SNMP	Silicon Graphics 4D/30IRIS workstation; 16M bytes of RAM, 380M bytes of disk storage; color graphics display	Version 4.0 of vendor's Unix-based operating system (IRIX)	X Window/Motif-based graphical user interface; communications interface supports customized protocol additions; option traffic monitoring package; APIs included	Over 30 third-party vendor MIBs currently supported; facilities for third-party MIB importing included	Internet MIB support unspecified; Internet and ISO SMI formats supported; SNMP over UDP/IP; other protocols can be customized; GETs, SETs, and customized TRAP monitoring	3,000 nodes	Software starts at $50,000; hardware extra
Sun Microsystems, Inc. **Mountain View, Calif.** **(415) 960-1300**	SunNet Manager 1.1	Generic software platform supporting SNMP or other protocol network management applications; includes many inherent SNMP facilities, supports any device with an SNMP agent	Sun SPARCstation or any X Window display device; 12M bytes of RAM, 10M bytes of disk storage	SunOS 4.X (or other Unix) with Open Look/X Window support	Graphical user interface; point-and-click operation; APIs for adding agents, protocols, user tools and applications; data stored in ASCII for access by most Unix analysis programs	Most vendor-specific as well as draft or proposed MIBs have been adopted; facilities for third-party MIB importing included	MIB I, MIB II; uses Internet SMI (RFC 1155); SNMP over UDP/IP; vendor offers support for multiple Proxy agents (protocol translators); GETs, SETs and customized TRAP monitoring, depending on SNMP management application that is running	No software-contrained limit	$3,000 for most users, discounts for academic environments; this platform software usually requires additional Unix applications; all hardware extra
SynOptics Communications, Inc. **Santa Clara, Calif.** **(408) 764-1046**	LattisNet Basic and Advanced Network Management for Ethernet and Token Ring	Software systems for managing token-ring and Ethernet LANs (physical and media access control layers) and network devices via SNMP	386-based PC or compatible; 4M to 6M bytes of RAM, 10M bytes of disk storage; VGA or color monitor	DOS 3.2 or later with Windows 3.0	Windows-based graphical user interface; expanded, ring, and segment views; no APIs	4 vendor-specific MIBs currently supported; no user-accessible facilities for third-party MIB importing	MIB I; uses Internet SMI (RFC 1155); Advanced version also supports MIBs in Concise SMI format; SNMP over UDP/IP; Telnet support; GETs, SETs and customized TRAP monitoring	About 30 with Basic version or about 100 with Advanced version	$2,295 Basic software, $5,500 Advanced software (all hardware extra)
Synernetics, Inc **Billerica, Mass.** **(508) 670-9009**	Viewplex LAN Management System, Release 1.0.0	Management system that runs on vendor's LANplex hub, manages any SNMP devices, as well as FDDI LAN-attached devices	Operates in conjunction with vendor's LANplex 5000 series of hubs; runs on Sun SPARCstation with 12M bytes of RAM	SunOS with Open Look and X Window	X Window-based, object-oriented user interface; user tailors templates for presentation of network information; no APIs specified	Third-party vendor-specific MIB support not specified; vendor-specific MIB-importing utilities included	MIB I, MIB II, draft Ethernet and FDDI MIB standards, and FDDI SMT; uses Internet SMI (RFC 1155); SNMP over UDP/IP and FDDI SMT; CMIP planned; GETs, SETs and customized TRAP monitoring	No software limit	$19,900 (software only; all hardware extra)
3Com Corp. **Santa Clara, Calif.** **(408) 764-5000**	ViewBuilder	Software system designed to manage vendor's hubs, network adapters, bridges and terminal servers	386/486-based PC, PS/2 or compatible; 8M bytes of RAM, 40M bytes of disk storage; VGA monitor	OS/2 1.2 or 1.3	Graphical interface via OS/2 Presentation Manager; includes 7K byte of software load for managing DOS stations; APIs not indicated	MIB extensions included for managing wiring hub and network adapters	MIB II; uses Internet SMI (RFC 1155), also supports Concise MIB format (RFC 1212); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	Several thousand nodes	$3,995 basic management software, $2,495 extra for graphical application or desktop management
T3plus Networking, Inc. **Santa Clara, Calif.** **(408) 727-4545**	BMXView Version 1.0	Software system that provides an SNMP Proxy agent for managing vendor's T-3 Bandwidth Manager systems	Sun SPARCstation IPC; 8M bytes of RAM; color monitor	SunOS with OSF/Motif support	Graphical user interface	No third-party MIB support; software performs as an SNMP Proxy agent that communicates with T-3 nodes via RS-232/HDLC links and with SNMP manager via SNMP	MIB II; uses Internet SMI (RFC 1155), SNMP over UDP/IP (to SNMP manager); supports GETs, SETs and TRAPs (as a Proxy for managed T-3 Bandwidth Managers)	250 devices	$15,000 (software only; all hardware extra)

API = Application program interface
CMIP = Common Management Information Protocol
CMOT = CMIP over TCP/IP
EGA = Enhanced graphics adapter
IPX = Internetwork Packet Exchange
ISO = International Standards Organization
MIB = Management Information Base
NMS = Network management system
ODS = Optical Data Systems

OSF = Open Software Foundation
RFC = Request For Comments
RISC = Reduced Instruction Set Computer
SCO = The Santa Cruz Operation, Inc
SMI = Structure of Management Information
SMT = Station management
SNMP = Simple Network Management Protocol
UDP = User Datagram Protocol
VGA = Video graphics adapter

This chart includes a representative selection of vendors of SNMP management tools. Some vendors not included offer a full range of competitive products.

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(continued from page 48)

for the task. They offer the right range of processing power, memory and disk storage, which is neatly packaged in a single-user system with a high-resolution monitor. The Sun workstations also feature a graphical interface that is user-friendly, usually mouse-driven and based on the X Window System.

Sun's hardware isn't the only reason that its workstations have become so popular for this purpose. Another factor is SunNet Manager, a sophisticated, generic software package that is not an SNMP management system per se, although it inherently includes the majority of functions that an SNMP manager needs.

Rather, this package, which costs $3,000 per copy, provides a net management-oriented software operating environment, on top of which vendors add their own customized SNMP-management application. The third-party vendor's application is typically all that is needed to convert the system into a comprehensive SNMP management system.

SunNet Manager is equally adaptable to becoming a DECnet Phase IV management station or an Open Systems Interconnection Common Management Information Protocol management station, according to Linda Stewart, product marketing manager with Sun Technology Enterprises, Inc. in Mountain View, Calif.

More than a half dozen of the SNMP network management systems profiled in the chart are the products of third-party vendors whose systems are really just applications that run over SunNet Manager and SunOS on a Sun workstation. These include Cabletron Systems, Inc., Fibermux Corp., Racal InterLan, Inc., Retix and SynOptics Communications, Inc.

Feature comparison

Most of the SNMP management products profiled in the chart are designed to perform as generic SNMP management systems — that is, they are capable of managing any vendor's device that contains an SNMP agent.

The minimal set of features that would be supported between a generic manager

(continued on page 58)

SNMP vs. NetView

With the rapid proliferation of the Simple Network Management Protocol (SNMP), the industry is witnessing the first real competition to IBM's NetView as the most prevalent and widely used network management package. Indeed, even some true-Blue loyalists are kicking SNMP's tires.

Largely due to management standards such as SNMP, NetView is rapidly losing ground among users, according to recent user surveys (see "Survey: Drawing a bead on net managers' top concerns," *NW*, June 3).

The long-term prognosis for NetView is not good. The diversity of SNMP management packages stands in stark contrast to NetView and underscores some of the major problems IBM must come to grips with. NetView is proprietary and is only useful for managing Systems Network Architecture networks. SNMP, however, was developed expressly for managing a mix of vendors' devices and systems.

The long-term prognosis for NetView is not good.

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But even more likely to erode NetView's base is the fact that NetView requires an IBM or compatible mainframe to run. It does not necessarily require that the mainframe be dedicated to network management.

However, IBM users agree that running all of NetView's software components and modules concurrently while managing a sizable SNA network seldom leaves enough horsepower on the typical IBM mid-range mainframe to do much else.

By comparison, SNMP management software is available to run on a wide spectrum of systems. These range from a rudimentary DOS-based personal computer to an 80386-based workstation running Unix or Microsoft Corp. Windows on DOS to a Sun Microsystems, Inc. SPARCstation to an IBM RISC System/6000.

Some of the more advanced features of NetView, such as one module that performs an artificial intelligence-like diagnosis of link problems, still generally outshine the level of functionality available today with SNMP products.

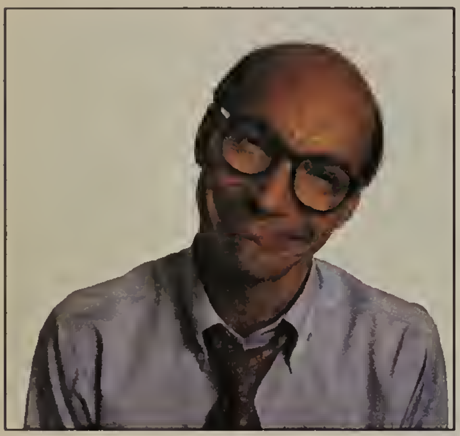
However, several SNMP vendors are working on such sophisticated software functionality, and users can expect a rash of application enhancements for SNMP-based systems to be announced within the next few months.

— *Edwin Mier*

"Hello Mike? What does hard disk failure mean anyway?"

"Mike, we're spending a fortune on these PCs–where is all this money going?!!"

"Hi Mike, can you help me? I can't get on the network."

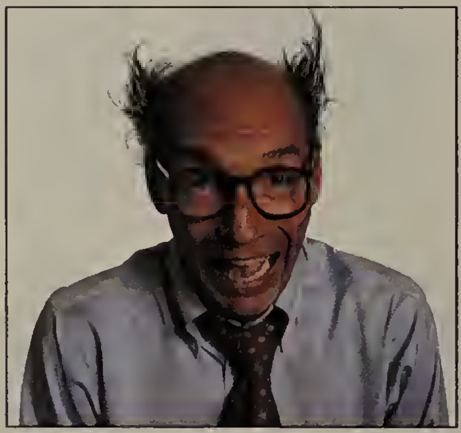


"I have some questions about this DOS stuff. Gotta minute?"

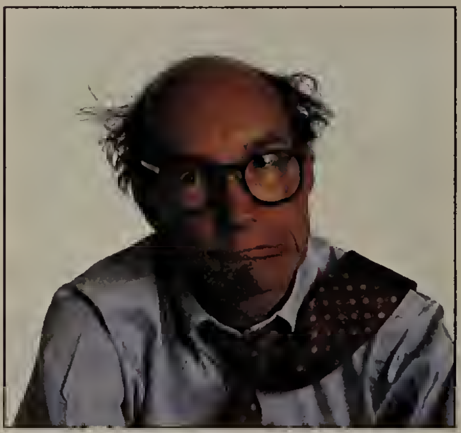
"Quick Mike, I desperately need a color monitor for a big presentation to our CEO!!"

"Hello Mike, sorry, I forgot my password. Again."

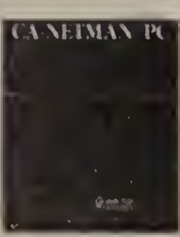
"How come they got it and we didn't get it, huh Mike? What's the deal?"



"Mike, I'd like a summary of exactly what you and your people do all day on my desk by noon tomorrow."



"Yo Mike, there's some smoke coming out of the side and this big, loud buzzer noise...Mike? Hello, Mike?!"



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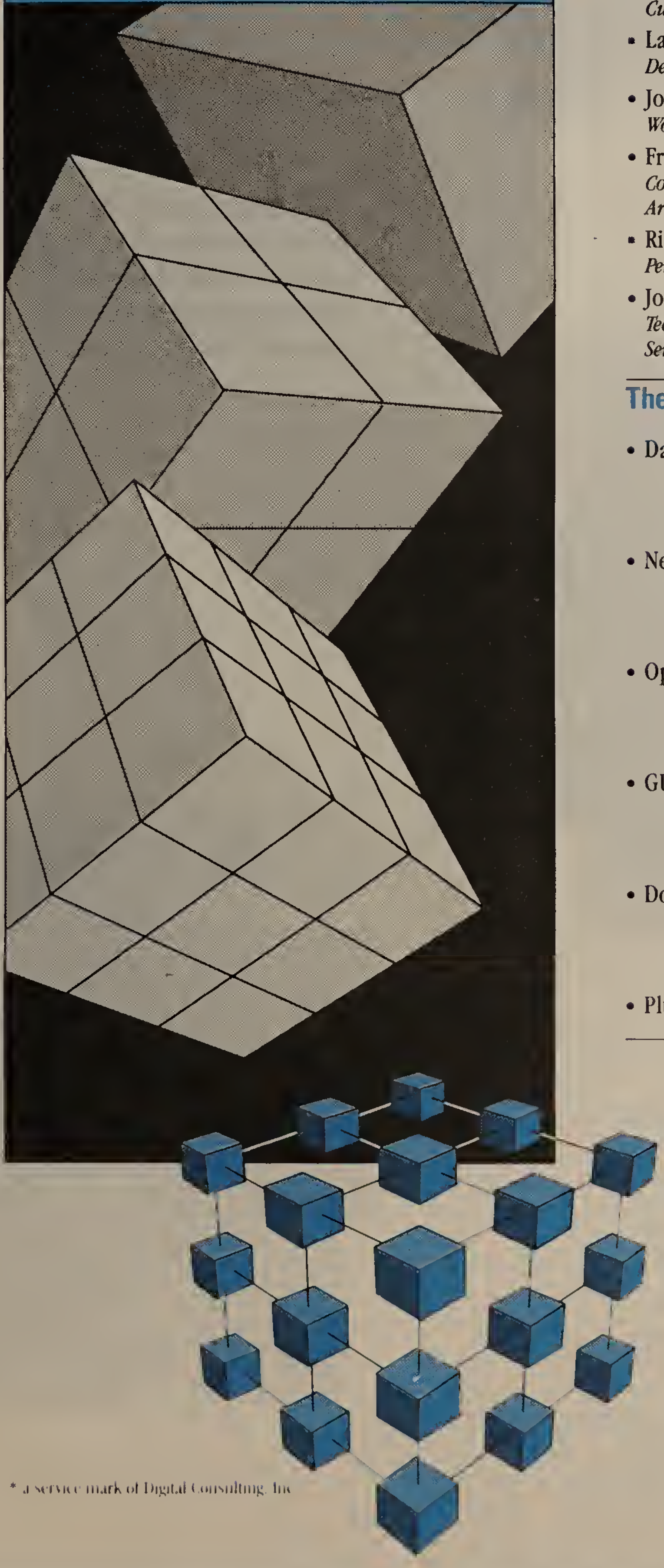

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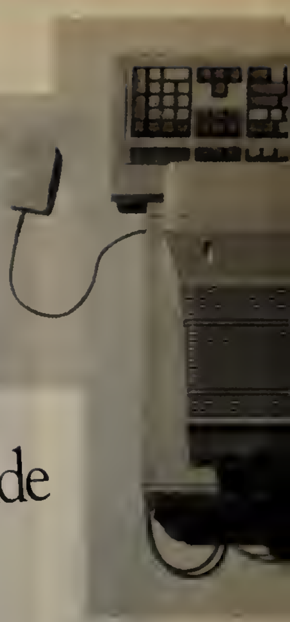

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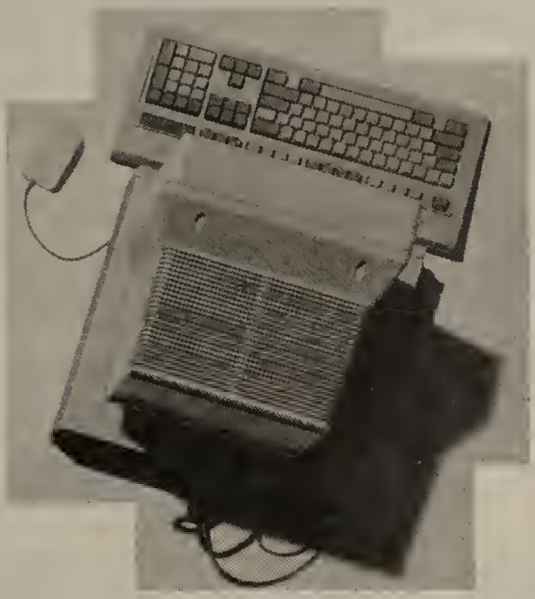

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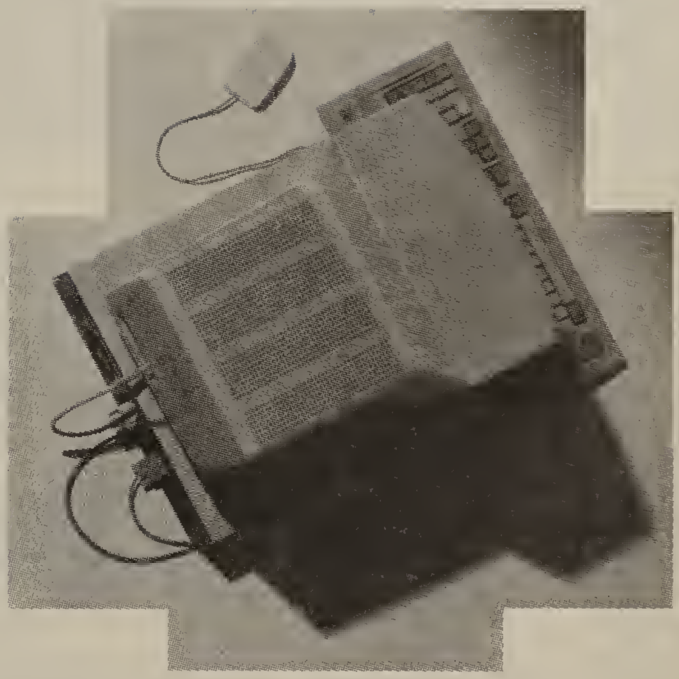

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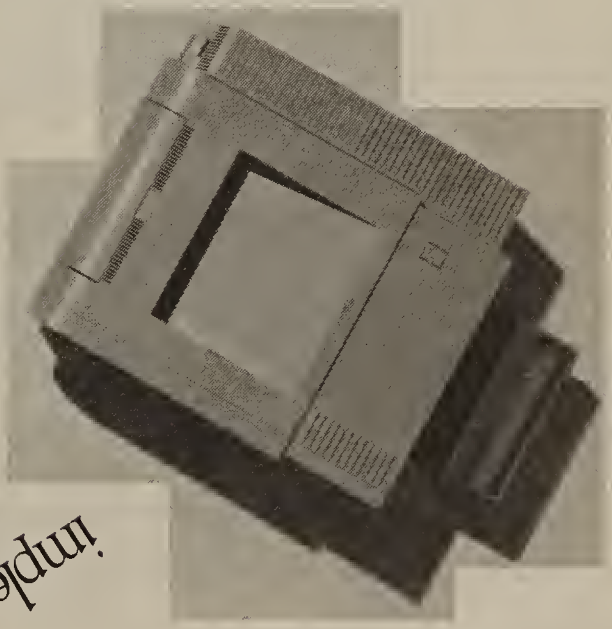

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NETWORK WORLD

SNMP management tools (continued from page 52)

Vendor	Product	Description	Hardware platform	Operating system	User application interface	Vendor-specific MIB support	SNMP standards and features supported	Managed device capacity	Price
Timeplex, Inc. **Woodcliff Lake, N.J.** **(201) 391-1111**	TIME/LAN 100 NMS	Software system for managing any device that implements SNMP	Sun IPC workstation; 12M bytes of RAM, 300M bytes of disk storage; color monitor	SunOS 4.1.1	Window-based graphical user interface; network topology map; Trap/fault analysis; SQL relational data base	Vendor's MIB extensions included with package; vendor-specific MIB-importing utilities included	MIB II; uses Internet SMI (RFC 1155); SNMP over UDP/IP or TCP/IP; GETs, SETs and TRAPs	Several hundred (memory and disk constrained)	$10,000 for basic package; $16,000 for comprehensive package, including SQL relational DBMS
Ungermann-Bass, Inc. **Santa Clara, Calif.** **(408) 496-0111**	NetDirector Version 16.4	Software system for managing any device that implements SNMP	386/486-based PC or PS/2; 12M bytes of RAM, 160M bytes of disk storage; VGA color monitor and mouse	OS/2	Mouse-driven, Windows-based graphical user interface via OS/2 Presentation Manager	3 vendors' MIBs currently supported; vendor-specific MIB-importing utilities planned for 4Q '91	MIB I, MIB II; supports Internet SMI formats (RFC 1065 and RFC 1155); SNMP over UDP/IP; GETs, SETs and TRAPs	No software limits	$7,500 to $16,000, based on network size (software only; all hardware extra)
Vitalink Communications Corp. **Fremont, Calif.** **(415) 794-1100**	WANmanager Software Version 1.1.1	Software system for managing vendor's network products, as well as those of several other select vendors, via SNMP	DECstation 2100/3100 or VAXstation 3100; 16M bytes of RAM, 104M bytes of disk storage; color display	DEC Ultrix with DEC Windows	Windows-based user interface; pull-down menus; APIs provided via Ultrix	MIB extensions for 3 vendors' products included; currently, no facilities for importing other third-party MIBs	MIB I, MIB II; uses Internet SMI (RFC 1155); SNMP over UDP/IP; other protocols supported for remote bridge management; GETs and SETs	250 devices	$10,000; $5,000 for additional copies (software only; all hardware extra)
Wellfleet Communications, Inc. **Bedford, Mass.** **(617) 275-2400**	SNMP-NMS Version 3.0	Software system for managing any device that implements SNMP	Sun-3, SPARCstation; 8M bytes of RAM, 10M bytes of disk storage; any monitor	SunOS 4.0 or later with X Window support	X Window interface featuring real-time graphics, point-and-click access, pop-up windows and menus; Unix shell script access to most functions	9 vendors' MIB extensions currently included; no vendor-specific MIB-importing capability	MIB I; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs and SETs	1,024 agents	$15,000 (software only; all hardware extra)
Wollongong Group, Inc. **Palo Alto, Calif.** **(415) 962-7100**	Management Station Release 2.0	Software system for managing any device that implements SNMP	Several: Sun-3, SPARCstation, DECstation, DECsystem, Motorola, Inc. Multi-Personal Computer, 386/486 PC; 12M to 16M bytes of RAM, 20M bytes of disk storage	Unix (SunOS 4.X, DEC Ultrix 4.X, SCO Open Desktop 1.X, or Unix System V Release 3) with X Window support	X Window graphical user interface; menu- and icon-driven; configurable map menu; 3 APIs for C language programs included; embedded SQL interface	8 vendors' MIB extensions currently included; vendor-specific MIB-importing utilities included	MIB I, MIB II; uses Internet SMI (RFC 1155); also supports NYSERNET/Performance Systems International format for MIBs; SNMP over UDP/IP, as well as over OSI connectionless network/transport protocols; GETs, SETs and TRAPs	No software limit	$10,000 (software only; all hardware extra)
Xyplex, Inc. **Boxborough, Mass.** **(508) 264-9900**	MAXserver ControlPoint Version 1.0	Software system for managing network devices via SNMP; currently oriented toward managing only vendor's devices	Sun-3, or Sun-4 workstation; 12M bytes of RAM, 4M bytes of disk storage	SunOS 4.1 or later, SunNet Manager 1.1 or later, and Sun OpenWindows	Windows-based graphical user interface; user-customized screens; no APIs but includes user script capability	Support for third-party vendor-specific MIBs is not provided in current release	MIB II and many draft MIB standards (such as Ethernet and Hub); SNMP over UDP/IP; also supports Telnet and DEC's Remote Console Protocol; GETs and SETs	About 12 systems	$3,995; SunNet Manager software is additional (all hardware extra)
Zenith Electronics Corp. **Glenview, Ill.** **(708) 391-8000**	Enterprise Exchange Manager Version 1.5	Software system oriented toward managing vendor's hubs and modules via SNMP; generic manager support planned	386-based PC; 8M bytes of RAM, 80M bytes of disk storage; VGA color monitor and mouse	Interactive Systems' IX/386 Unix, X Window, OSF/Motif support and TCP/IP	Menu-driven, color graphical user interface; point-and-click mouse-driven operation; SQL interface	Includes support for vendor's MIB extensions; third-party MIN-importing facilities planned but not yet available	MIB I, MIB II; uses Internet SMI (RFC 1155); SNMP over UDP/IP; GETs, SETs and customized TRAP monitoring	256 agents	$4,495; $1,495 for operating system software (all hardware extra)

API = Application program interface
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CMOT = CMIP over TCP/IP
EGA = Enhanced graphics adapter
IPX = Internetwork Packet Exchange
ISO = International Standards Organization
MIB = Management Information Base
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SMT = Station management
SNMP = Simple Network Management Protocol
UDP = User Datagram Protocol
VGA = Video graphics adapter

This chart includes a representative selection of vendors of SNMP management tools. Some vendors not included offer a full range of competitive products.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

(continued from page 54)

and any vendor's SNMP agent-equipped device are:

- Support for the SNMP protocol over the User Datagram Protocol/Internet Protocol (UDP/IP). UDP is a minimal version of the transport-layer Transmission Control Protocol. UDP/IP can be run over local- or wide-area network links, as well as between SNMP management systems and agents over LANs, even if other protocols, such as Novell, Inc.'s Internetwork Packet Exchange (IPX) or DEC's DECnet, are the main ones supporting user network applications.
- Support within the manager for one or more of the accepted SNMP Structure of Management Information formats. These formats include the original specification defined in Request For Comments (RFC) 1065, the standard version later adopted, as defined in RFC 1155 (virtually the same as the earlier proposed standard version) or the more recent Concise Format defined in RFC 1212.
- Support for the approximately 110 object variables contained in MIB-I. A newer MIB-II, which is the final stage in the Internet standards community and which is soon to be a recommended standard, will more than double the number of standard objects that can be queried.

While about 60% of the management systems in the chart already support MIB-II, fewer than 20% of the device agents currently do. A MIB-II manager can still work with a MIB-I agent, although only MIB-I objects can be retrieved. Users can reasonably expect MIB-II to be almost universally supported by both managers and agents within one to two years.

Several of the packages shown in the chart are currently oriented toward managing a single vendor's devices via SNMP — usually the vendor that offers the SNMP software package. In some cases, these packages contain most of the software functionality needed to perform as a generic SNMP manager.

However, the MIB directory of objects within these packages is either incomplete for generic-manager operation or oriented toward the SNMP object extensions the particular vendor has developed for its own products.

Vendor-specific extensions

Many SNMP-supporting equipment manufacturers have developed their own vendor-specific (also called enterprise-specific) MIB extensions. Some SNMP management systems support the addition of any third-party vendor-specific MIB extensions to an otherwise generic SNMP manager (called importing the MIB); some, however, do not. SNMP management systems that primarily support a single vendor's MIB extensions do not usually offer the utilities necessary to import other vendor's private MIB extensions.

Examples of vendor-specific SNMP management products listed in the chart include products from Alantec, Fibermux, Microcom, Inc., Newbridge Networks, Inc. (8001 LAN Manager), T3plus Networking, Inc. and Xyplex, Inc.

About 60% of the management systems in the chart already support MIB-II.

▲▲▲

Several SNMP management systems are full-function generic SNMP managers but include either special capabilities for managing the particular vendor's devices or support for non-SNMP protocols in addition to SNMP.

Examples of these packages include: Cabletron Systems' Remote LANVIEW/Windows, which also supports the vendor's older, proprietary network-management protocol; DEC's DEC Management Station for Ultrix, which also handles DECnet Phase IV network management; and Hewlett-Packard Co.'s OpenView Hub and Bridge Manager packages that provide added functionality for managing HP's hubs and bridges, respectively.

Also listed in the chart are packages, tools and utilities that are related to SNMP management but aren't themselves SNMP management systems. Included in this category is The AG Group's EtherPeek, an Apple Computer, Inc. Macintosh-based network analyzer software program, which permits SNMP messages to be manually generated, filtered, captured and decoded.

For IBM shops that are expanding their horizons or migrating away from NetView and toward SNMP, some vendors offer special features or packages for linking the two disparate net management worlds.

One of these is Bell Atlantic Software Systems' IntelliManager, which, running on a Sun SPARCstation or IBM RISC System/6000, provides a full-function bidirectional interface — a protocol conversion gateway — between an SNMP manager and an IBM NetView host, according to Jim Donaghey, IntelliManager's product sales director.

For other products, interaction with IBM's NetView is usually more limited. Cabletron Systems, for example, offers a NetView gateway with its Spectrum Advanced Management System for the exchange of management information. And Digital Analysis Corp.'s EYE*NODE package will reportedly forward Traps to NetView, providing limited one-way passage of certain management messages.

> These high prices will start to drop as competition heats up.
>
> ▲▲▲

Just as the operating environments and hardware platforms supported by these SNMP management packages are widely divergent, so is the price range for these products. A full-featured, generic SNMP management system will cost about $10,000 today. Users should note that this is for software only, and that, depending on hardware platform, the bottom-line price could be more than twice that amount. The hardware cost of a 40-MHz Sun SPARCstation with a color monitor, for example, is $15,000.

There are alternatives that cost less, and one of these could suit a particular user's environment, depending on configuration. The SNMP manager equivalent of the Volkswagen Beetle has to be FTP Software, Inc.'s PC/SNMP Tools software product. At $300 per copy, it could be ideal for users that want to test the SNMP waters without getting in over their heads.

PC/SNMP Tools has no fancy graphical user interface; it runs on a DOS-based personal computer with 640K bytes of random-access memory (an enhanced graphics adapter card is needed only if graph functions are used). The package is a generic manager that includes full MIB-I support. Unlike many of the higher priced alternatives, no third-party vendor MIB support is inherently included. But like the more expensive alternatives, some software features that permit access to other vendors' private MIBs are included.

One of the real limitations to FTP Software's package, as well as other inexpensive and DOS personal computer-based managers, is the size of the net that can be managed. FTP Software says its package can fully monitor up to 80 agent devices — more if certain functions, such as polling of agents, is limited or disabled.

Many of the higher priced SNMP management systems can control hundreds, even thousands, of agent devices. But in many cases, this number will be limited to the system's I/O and storage capacity, and the number of manageable devices may be much less than the stated maximum.

Typically, users can set the frequency with which the system regularly polls the agent devices. However, the number of managed devices will again be a limiting factor because only a certain number of GET polls and response messages can be processed over a given period of time, even with a high-powered workstation.

Prices for SNMP management software packages are high, likely reflecting the development effort vendors have expended during the last year, especially in debugging and loading third-party vendor MIBs, and in developing utilities for users to import other MIBs on their own.

But SNMP is a new and rapidly emerging market. There is no question that these initial high prices will start to drop as competition heats up and vendors begin to recoup their investments. Whether this will occur later this year or next, or whether the potential buyer should wait and see, depends on the user's budget and the organization's need to get its mixed-vendor network under control. ◼

Two in-depth special reports on Systems Network Management Protocol (SNMP) are being prepared and will be available soon. The first is designed to provide guidance to net managers interested in enterprisewide SNMP management. The second, including details of the *Network World*/AT&T Bell Laboratories SNMP Test Series, is aimed at SNMP product developers.

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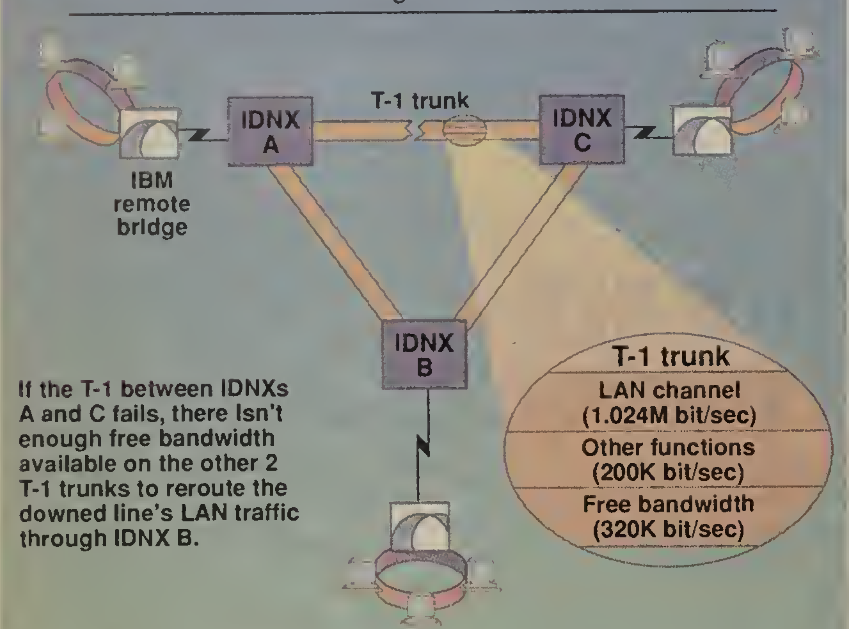
A net too big for its bridges

continued from page 37

configuration and route recovery. And although most of The Travelers' routers would be located in remote sites, router configuration and management would have to be accomplished from a centralized site.

Rerouting limitations in a bridged net

Figure 1


T-1 trunk
IDNX A
IDNX C
IBM remote bridge
IDNX B
T-1 trunk
LAN channel (1.024M bit/sec)
Other functions (200K bit/sec)
Free bandwidth (320K bit/sec)

If the T-1 between IDNXs A and C fails, there isn't enough free bandwidth available on the other 2 T-1 trunks to reroute the downed line's LAN traffic through IDNX B.

IDNX = Network Equipment Technologies, Inc.'s Integrated Digital Network Exchange multiplexer

GRAPHIC BY SUSAN SLATER

SOURCE: THE TRAVELERS CORP., HARTFORD, CONN.

To test the LWX, we used three IDNXs containing a total of five LWX cards. Connected to the cards were token-ring LANs supporting front-end processors, workstations, servers and IBM bridges.

The Travelers tested the LWX for compatibility with several IBM 3270-emulation software packages, including IBM's OS/2 Extended Edition Communications Manager, Attachmate Corp.'s Attachmate and Wall Data, Inc.'s Rumba.

We also used IBM's LAN Manager, DOS-based PC Network Program and OS/2 File Server as well as Novell, Inc.'s Internetwork Packet Exchange (IPX) applications. Stress tests were conducted using Network General Corp.'s Sniffer and IBM's Teleprocessing Network Simulator.

Router advantages

Our initial testing alone made evident the advantages that routers, in general — and the LWX, in particular — have over bridges. For example, an IBM remote bridge can be linked to only one other bridge. By contrast, one LWX can have direct links to eight other LWXs (see "More on the LWX," page 62).

Currently, all of The Travelers' LANs are bridged into two data center backbone LANs, requiring about 35 pairs of IBM remote bridges. By replacing the bridges with LWX routers, we could significantly reduce the number of network devices that need to be managed, while equally reducing the number of potential network failure points.

Another advantage routers have over bridges is that they can maintain a more robust network by routing around circuit breaks or equipment outages.

By contrast, when a route is lost in The Travelers' current bridged network, the sessions, which run under SNA and NETBIOS, cannot recover. The reason is SNA and NETBIOS session traffic must travel on a single route between partners. If a route fails on a bridged network, the session is abnormally terminated, resulting in a potential loss of data.

As the applications attempt to reestablish the route, the network can become flooded with route discovery requests, which, of course, are broadcast packets. This is equivalent to the problem of "broadcast storms" that have troubled many bridged configurations.

A router can prevent route failures by redirecting traffic between LANs over alternative links. The LWX does this conveniently because it resides in the IDNX multiplexer.

Currently, most of The Travelers' LAN circuit bandwidth ranges from 56K to 256K bit/sec. In addition to its other fixed circuits, The Travelers reserves T-1 bandwidth for voice calls and traffic reroutes during outages. Thus, when one T-1 fails, generally some of its lower bandwidth circuits can be rerouted by using the unallocated bandwidth available on an alternate T-1.

However, as The Travelers' LAN traffic continues to grow, higher bandwidths will be required, which the alternate links may not be able to accommodate. For recovery to occur, the alternate links must be able to absorb the entire bandwidth of the original circuit.

For example, in Figure 1 on this page, if each of the LAN channels between IDNXs A, B and C requires 1.024M bit/sec, only 320K bit/sec of unallocated bandwidth would remain on each T-1 trunk. (The IDNX reserves the remaining 200K bit/sec of T-1 bandwidth for operations and other functions.) This unallocated bandwidth obviously would not be sufficient to handle a circuit reroute because 1.024M bit/sec of bandwidth is required.

Recovery options

To avoid this problem, the LWX offers two additional recovery options. The fastest recovery method is a form of physical link rerouting.

This option takes advantage of the LWX's ability to implement load sharing over concurrent parallel routes. Transmitting LAN traffic via several parallel lower bandwidth routes increases the possibility of finding a backup link if the existing circuit goes down.

In Figure 2 on this page, LWXs reside in IDNXs A, B and C, which are interconnected by a triangle of T-1 circuits. Multiplexed onto each T-1 are four 256K bit/sec parallel LAN channels (totaling 1.024M bit/sec); 320K bit/sec of unallocated bandwidth is reserved for circuit reroutes and on-demand voice traffic.

If the T-1 between IDNXs A and C fails, IDNX A can use the unallocated bandwidth in the other two T-1 lines to reroute one of the four 256K bit/sec LAN channels through IDNX B. This reroute can occur fast enough to avoid session loss.

The second recovery option is provided by the LWX's Internet Protocol routing layer. At startup, the LWX dynamically discovers all direct and indirect routes to its partners. Each route comprises one or more physical LAN circuits, and more than one IP route can ride on the same physical circuit.

Using one of several user-defined algorithms, such as the Routing Information Protocol or Interior Gateway Routing Protocol (IGRP), the LWX assigns priority metrics to each route based on such factors as number of hops and bandwidth. These metrics are used to determine primary and backup routes.

For example, in Figure 3 on this page, two routes exist between IDNXs A and C. The LWX designates Route 1 as the primary route and Route 2 as the backup. Note that Route 2 uses the same physical LAN circuits used by IDNX B to route traffic to IDNXs A and C. If the T-1 carrying Route 1 is lost, the session will automatically recover onto Route 2.

However, rerouting at the IP level could be much slower than the LWX's first recovery option because route recovery delay is inherent in the routing protocol used. The length of the delay depends on the network size and the amount of routing overhead that is acceptable.

In the example depicted in Figure 3, let's say that the routers, using IGRP, exchange keep-alive messages every 10 seconds and routing table updates every 30 seconds, and they have a reroute delay of 60 seconds. Therefore, it would take between 90 to 150 seconds for the LWX residing in IDNX C to open Route 2 for traffic between IDNXs A and C. Defaults in most applications are set to time-out sessions well below this recovery time.

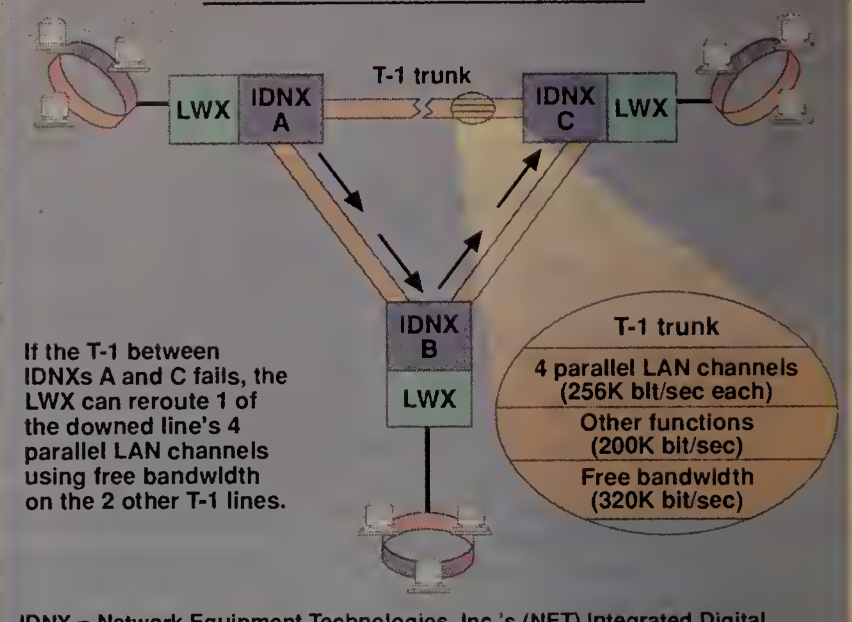
Thus, both of the router recovery options have advantages as well as disadvantages.

The first option provides faster recovery because it relies on the multiplexer, which can handle physical connections in microseconds. However, fragmenting high bandwidth into parallel, slower speed lines may have some impact on response time, depending on the application.

The second option is easier to implement but may be so slow that sessions may time-out before the route is recovered. The network designer must strike a balance between these two conflicting goals.

Physical-circuit reroute

Figure 2


LWX
IDNX A
T-1 trunk
IDNX C
LWX
IDNX B
LWX
T-1 trunk
4 parallel LAN channels (256K bit/sec each)
Other functions (200K bit/sec)
Free bandwidth (320K bit/sec)

If the T-1 between IDNXs A and C fails, the LWX can reroute 1 of the downed line's 4 parallel LAN channels using free bandwidth on the 2 other T-1 lines.

IDNX = Network Equipment Technologies, Inc.'s (NET) Integrated Digital Network Exchange multiplexer

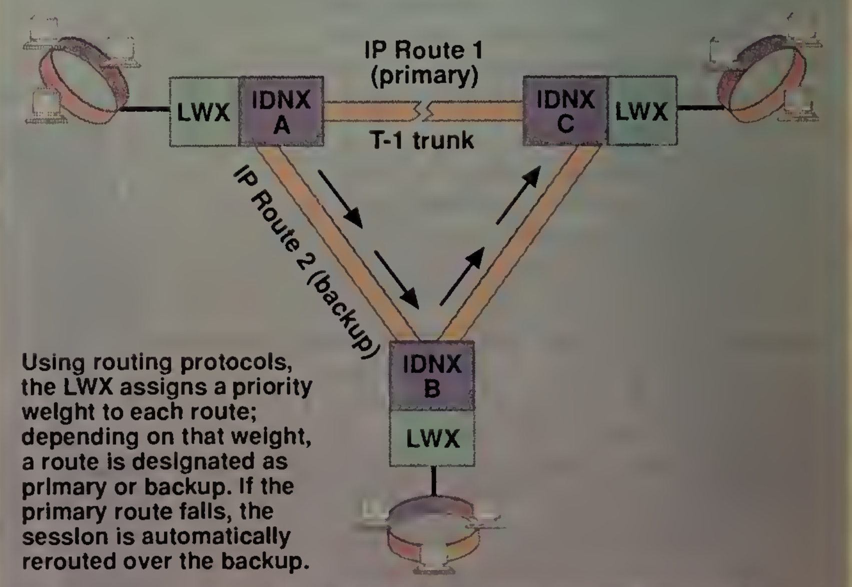
LWX = NET's Local-area network/Wide-area network Exchange router

GRAPHIC BY SUSAN SLATER

SOURCE: THE TRAVELERS CORP., HARTFORD, CONN.

Network-layer reroute

Figure 3



Using routing protocols, the LWX assigns a priority weight to each route; depending on that weight, a route is designated as primary or backup. If the primary route fails, the session is automatically rerouted over the backup.

IDNX = Network Equipment Technologies, Inc.'s (NET) Integrated Digital Network Exchange multiplexer

LWX = NET's Local-area network/Wide-area network Exchange router

GRAPHIC BY SUSAN SLATER

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Bridge deficiencies

Our test of the LWX also pointed out other limitations of the IBM bridges in our network. For instance, because IBM bridges consist of software running on an IBM Personal Computer platform, the lack of hardware redundancy is a major deficiency. If power is lost, the hard disk fails or the software program gets corrupted, the bridge can no longer function.

By contrast, because the LWX resides within the IDNX, it benefits from the multiplexer's existing hardware redundancy, including hot power, CPU and memory backup.

Remote management of IBM bridges is another problem. Software cannot be loaded onto IBM remote bridges from a centralized site. New software, bridge filter modifications and other configuration changes must be loaded from the Personal Computer's own disk drive.

When the bridge program is not operational, remote management is not possible. Therefore, technical staff must be on-site to perform software changes and troubleshooting. The problem is that remote bridges often are in sites where there is no resident technical staff.

The LWX, on the other hand,

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can be loaded and configured locally or remotely. This is possible because the IDNX in which the LWX resides reserves a separate, out-of-band channel for all remote commands and software loads.

The LWX also takes several steps to reduce overhead traffic. LAN overhead increases as the size of the network grows, and this unproductive traffic requires more bandwidth. In a token-ring network, overhead mainly comes from two sources: broadcast and receiver-ready messages.

In source routing, a broadcast is a message that discovers the location (LAN segment) and route to a specified destination, such as a workstation, server or front-end processor. A receiver-ready message is a two-byte, logical link control Type 2 frame used for acknowledgments, keep-alives and polls.

A broadcast is copied by bridges onto connected LANs. When the broadcast reaches its destination, a response is returned and bridges record the route in the returned frame.

There are two types of broadcasts — single-route and all-route broadcasts. In a meshed network, which provides multiple routes between source and destination LANs, bridges can be configured to limit one single-route broadcast to reach each LAN. Therefore, in a network of 200 LANs, one single-route broadcast frame is replicated 200 times.

All-route broadcasts can result in significantly more overhead. In a meshed network, each request can result in multiple copies reaching every LAN in the network ("Gridlock alert: source routing," *NW*, Nov. 12, 1990).

Controlling overhead

By contrast, the LWX uses router software based on Cisco Systems, Inc.'s code to reduce the number of LAN broadcasts in an SNA network. This software allows the LWX to learn the address, location and route of LAN-attached devices by scanning frames as they pass through the LWX's buffers. The LWX then stores the information in a memory cache.

When it receives a broadcast frame, the LWX checks its cache. If the cache contains the broadcast's destination address, the LWX responds to the sending device with a proxy rather than passing on the discovery packet. The proxy — a copy of what the sender would have received if the receiver had responded — looks identical to a broadcast response from the destination node.

In The Travelers' testing, these proxy responses appeared compatible with all SNA applications tested and were effective in containing SNA broadcasts. Unfortunately, the LWX, along with all other routers on the market, cannot "proxy" broadcasts that do not have unique destination addresses — for example, NETBIOS broadcasts, which use destination names rather than unique addresses.

Receiver-ready messages also create overhead. Some applications may send these 2-byte messages in response to every frame received and as often as every few seconds, even when a session is inactive. About 70% of The Travelers' LAN frames are receiver-ready messages, comprising about 25% of The Travelers' LAN line utilization.

Neither the LWX nor any router on the market have a mechanism to reduce the number of receiver-ready messages in a network. In fact, the LWX actually adds to the problem.

Like some other routers, the LWX currently uses Transmission Control Protocol/IP encapsulation to pass token-ring frames to another LWX. On the serial port, the token-ring frame encapsulated in TCP/IP is put inside a High-Level Data Link Control frame. This adds about 60 bytes to every receiver-ready message, thus decreasing the overall throughput of a link.

Tomorrow's traffic

So far, we have described how our tests show the LWX can deal with today's traffic. However, tomorrow's requirements are equally important.

New applications, such as image and real-time graphical displays, will generate high volumes of binary data, which must be rapidly transferred throughout the network. These applications are bursty and can cause congestion at bridges. When the teleprocessing link cannot handle the data volume, the bridge attempts to buffer it. When the bridge's buffers are full, frames are thrown away and the end node must retransmit. This results in slower end-user response time.

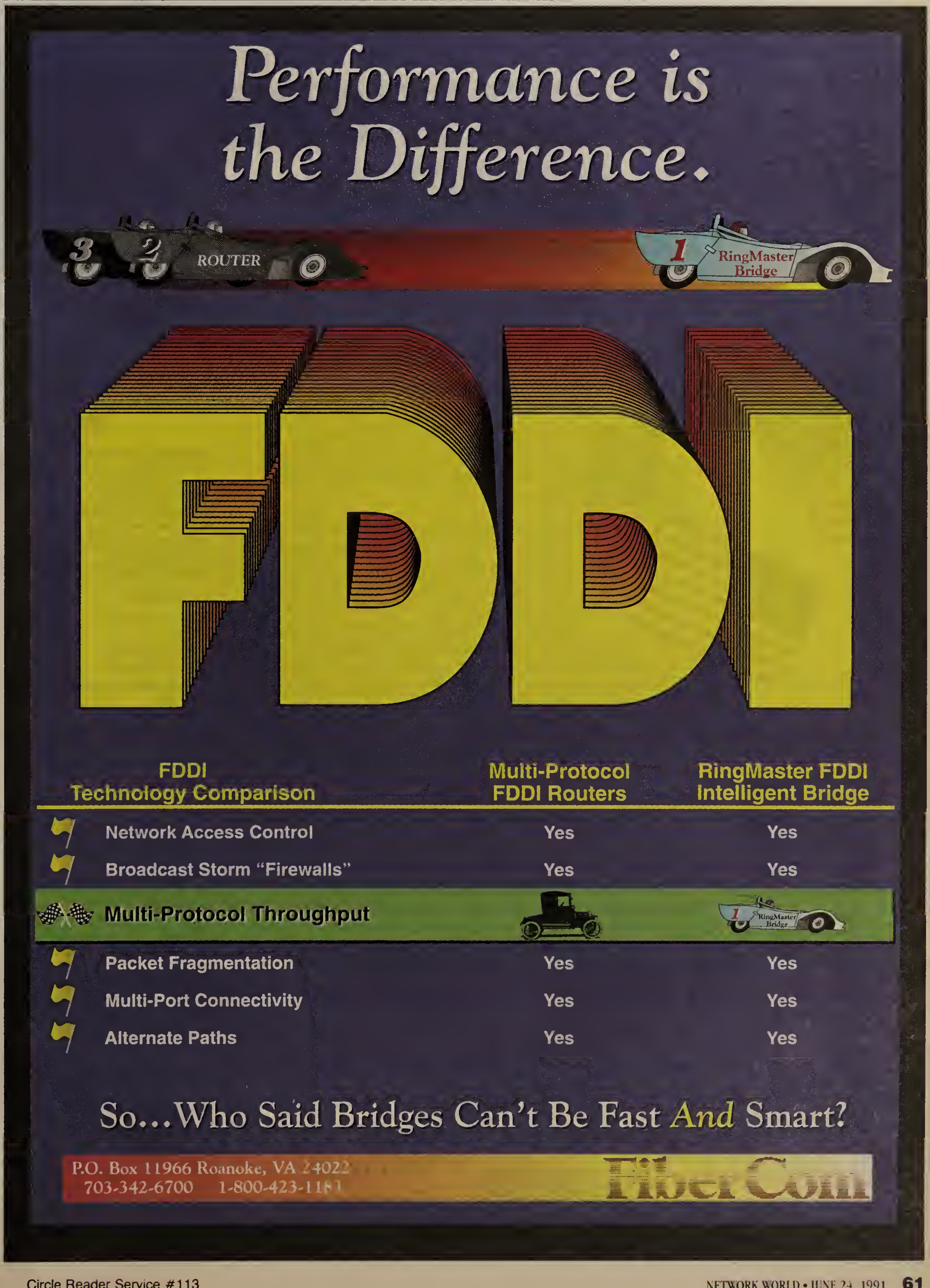
To handle bursty traffic, The Travelers requires a router that can drive several T-1s concurrently. A router that can add bandwidth dynamically would be an advantage in our sites that carry on-demand voice and backup SDLC lines.

Currently, the LWX is limited to adding bandwidth to LWX circuits either manually or automatically by the time of day. Sources at NET say the company is working on bandwidth efficiency features for future releases of the LWX. Last week, NET gave a statement of direction indicating the LWX and IDNX will support frame relay by mid-1992. This will allow the router to handle bursty traffic even more efficiently.

Adding it up

The LWX offers many advantages as a replacement for remote bridges. However, while the LWX could potentially replace all bridges at The Travelers, not all remote bridges in our network are collocated with an IDNX multiplexer. IDNXs are deployed in medium to large network concentrator sites.

(continued on page 62)



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(continued from page 61)

To completely replace remote bridges requires installing a compatible router solution in smaller sites as well. NET's stand-alone LAN Exchange 50 router is compatible with the LWX and could be used in some sites, but its price tag can be as high as $30,000. Therefore, it may be inappropriate for small, noncritical offices.

What we'd really like to see is either a low-end multiplexer with an LWX card or a stand-alone router, which provides varying levels of redundancy and benefits from an IDNX-type management system.

In the meantime, the LWX is the best existing router solution that The Travelers has found. Our test concludes that the LWX can support multiple links. It also provides remote configuration and management, and route recovery as well as reduced broadcast overhead.

The Travelers also found that the LWX adds value over a stand-alone router. As an integrated part of the IDNX multiplexer, it can provide fast rerouting at the physical layer.

We liked the IDNX redundancy and the use of reliable out-of-band management that the LWX provided. Also important to The Travelers was that the LWX provides a single WAN management interface.

But while the LWX solves many bridged network dilemmas for The Travelers, it leaves some problems unresolved. In its current release, the LWX reduces SNA broadcast overhead only; it does not reduce other types of overhead, such as that from NETBIOS broadcasts and receiver-ready messages.

The Travelers would also like to see the LWX do more for managing bursty traffic, such as by adding dynamic bandwidth allocation.

The cost of the LWX — $7,995 for the Ethernet version and $11,495 for the token-ring version with source route bridging and multiprotocol routing — makes it appropriate for medium to large LAN sites; small sites should investigate a more low-end, low-cost solution.

Despite these shortcomings, from our testing, The Travelers expects the LWX to be a strong contender in the router arena. ◼

More on the LWX

Last week IBM and Network Equipment Technologies, Inc. (NET) announced the Local-area network/Wide-area network Exchange (LWX) router, with availability scheduled for August.

The LWX is not a stand-alone router, but rather a card that can be plugged into NET's line of Integrated Digital Network Exchange (IDNX) multiplexers. Together with NET's Packet Exchange card, which is an implementation of NET's new packet-over-circuit architecture, the LWX router software and IDNX multiplexer form what the company calls its LAN/WAN enterprise solution.

The LWX software implements Cisco Systems, Inc. routing/bridging protocols on its front-end CPU card.

NET integrated this code into the IDNX platform. The company then added diagnostics, IDNX interfaces and monitoring tasks.

NET also equipped the LWX with Ethernet, token-ring and serial-line drivers. The LWX's front-end CPU card uses a Motorola, Inc. 68030 (25-MHz) processor, while the router's back-end token-ring card is manufactured by IBM.

LWX code is stored on a memory card that can reside in either the IDNX into which the LWX is plugged, or in a remote IDNX. The LWX configuration data base is stored in nonvolatile random-access memory.

As many as eight High-Level Data Link Control serial controllers can be configured to deliver frames through the transmission bus to be multiplexed out through IDNX trunk cards or to remote serial cards for interconnection with stand-alone routers.

The LWX supports Apple Computer, Inc.'s AppleTalk, Digital Equipment Corp.'s DECnet Phase IV, Hewlett-Packard Co.'s Apollo Domain, IEEE 802.2, 802.3 and 802.5, Novell, Inc.'s Internetwork Packet Exchange, the Transmission Control Protocol/Internet Protocol and Xerox Corp.'s Xerox Network Systems protocols on its adapter side.

To perform token-ring source route bridging, the LWX encapsulates the LAN-side protocol in TCP/IP and sends it out the serial interface. Under TCP/IP, the LWX supports the Interior Gateway Routing Protocol, Routing Information Protocol, Extended Gateway Protocol and Hello routing protocol.

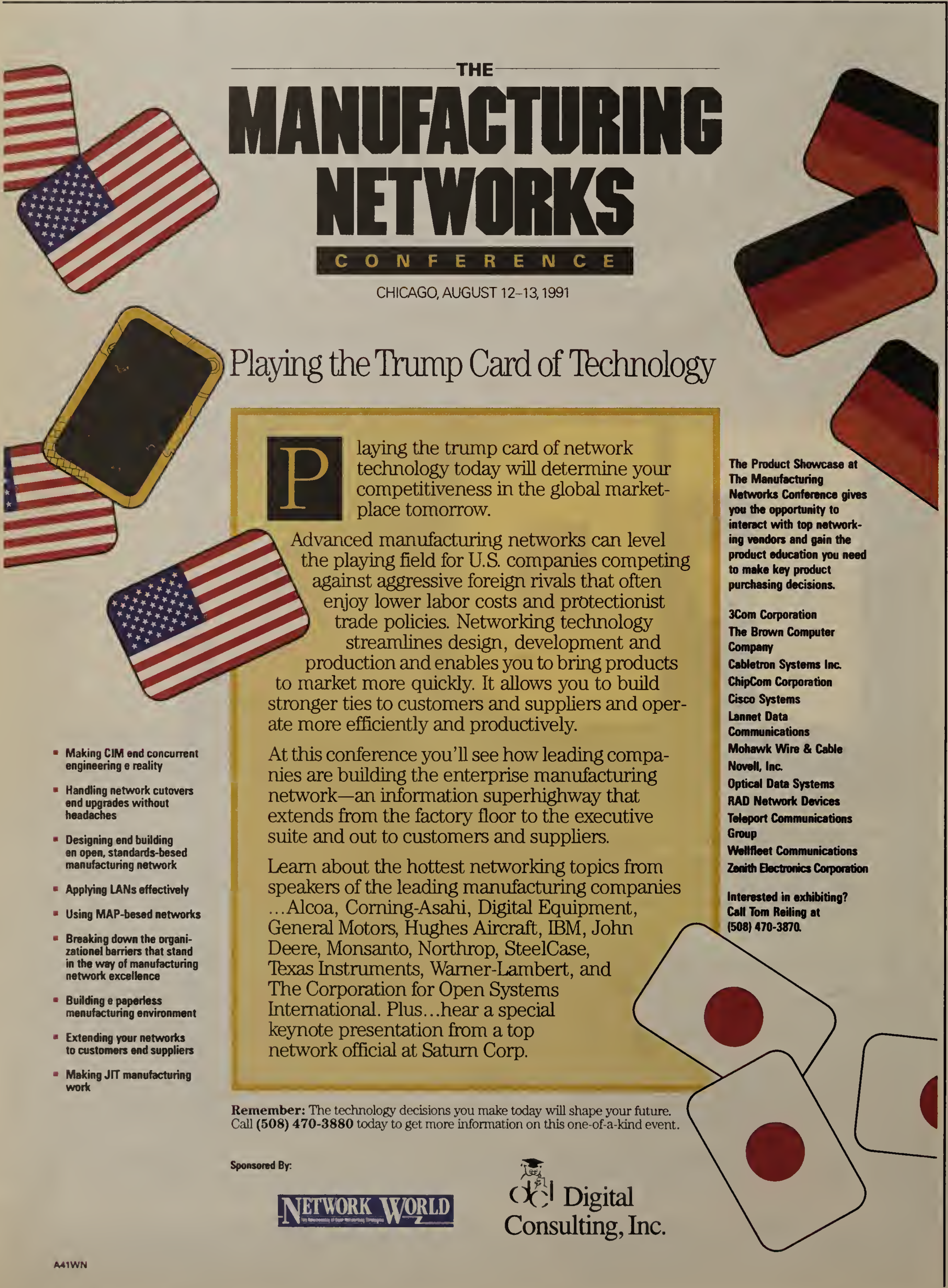
In addition, the LWX router can implement IEEE 802.1D transparent bridging.

All LWX cards can be managed from one or more LWX operations consoles and can be located anywhere in the IDNX network.

The LWX has a Simple Network Management Protocol (SNMP) agent for router management.

NET's Series 5000 management system provides SNMP-based management functions for LWX alerts and statistics retrieval, as well as IDNX management support.

— Steve Simon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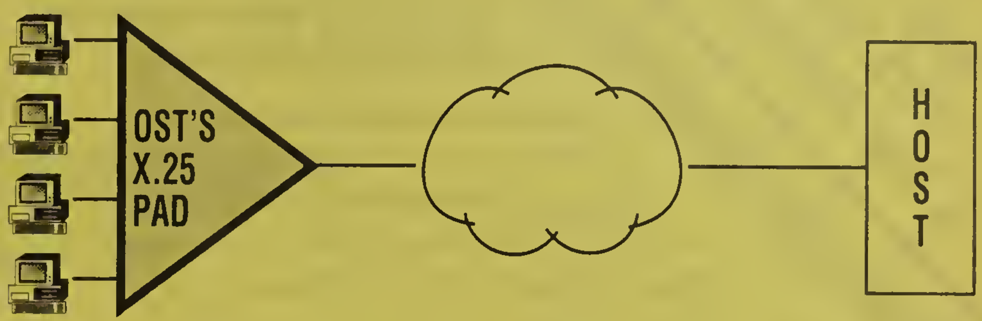

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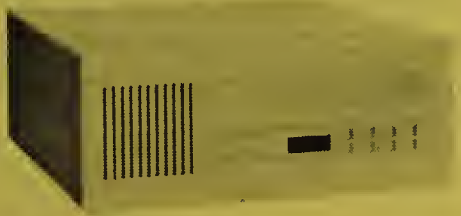

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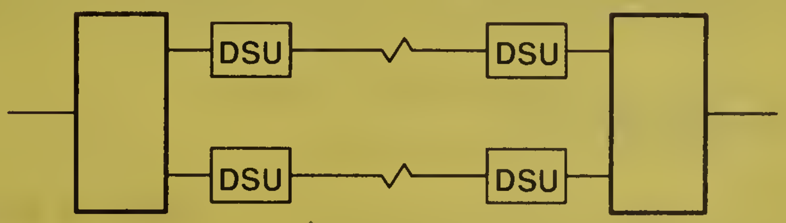

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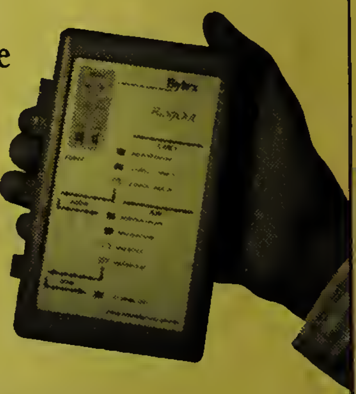

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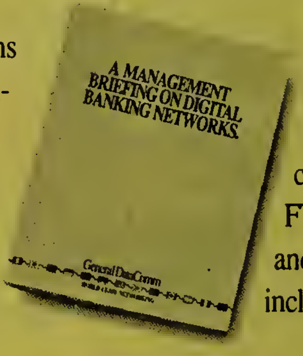

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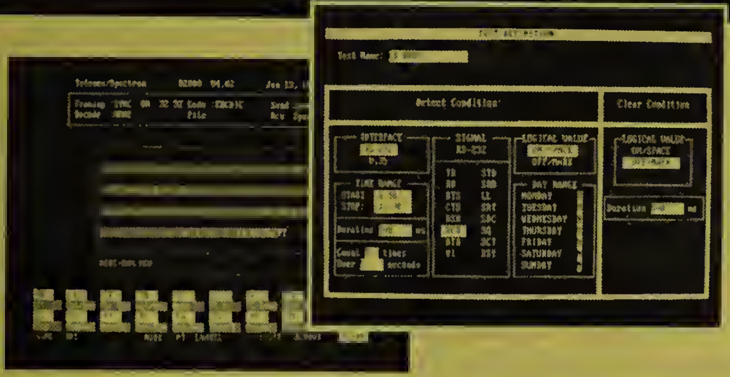

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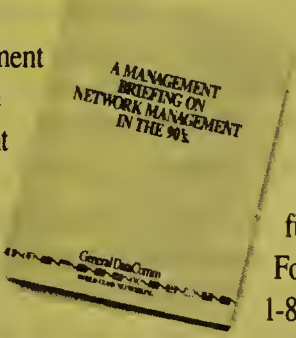

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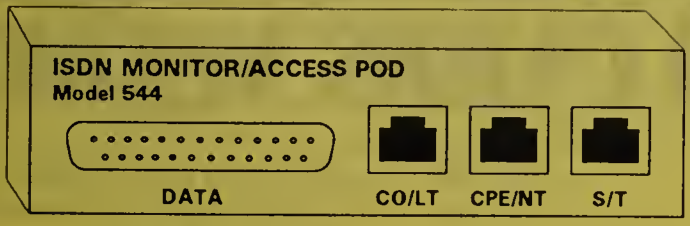

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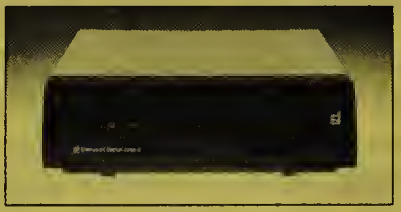

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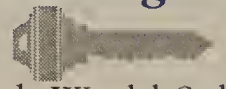

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Tool eases distribution

continued from page 2

week, uses the company's flagship XCOM 6.2 file transfer product to suppport delivery of software or data across a network via IBM LU 6.2 sessions.

XCOM/SDS consists of three components: the SDS repository manager, administrative workstation and LU 6.2 software.

The repository manager runs on IBM hosts under MVS. It tracks various parcels of software or data that are stored in host VSAM files waiting for shipment. Later versions of XCOM/SDS will also support files stored in DB2.

All scheduling of distribution jobs is handled on the administrative workstation, which can be a DOS or OS/2 machine.

The workstation runs a menu-driven program that supports grouping of users into categories, such as regional office, division or job function. Software can be distributed to a category of users, obviating the need to manually enter each individual user for every distribution job.

An unlimited number of administrative workstations can be used, each supporting different applications or configured with different levels of operator security and authority.

DOS or OS/2 workstations run recipient software, which lets the workstation support an LU 6.2-based file transfer. A recipient can be a server, local-area network node or host-attached workstation.

Spectrum Concepts' Sheik noted that NetWare supports software distribution from a server to attached workstations, and that Novell already packages a limited-use version of XCOM 6.2 with its Systems Network Architecture gateway. That product, as well as most other SNA gateways, can be used in conjunction with XCOM/SDS to ship software to Novell servers, which will then distribute software to attached end nodes.

For LANs not based on NetWare, an OS/2 workstation can be configured with an OS/2 version of the repository software that lets it receive software or data from a host, then handle distribution and scheduling for attached workstations.

Alternatively, DOS or OS/2 workstations can be configured with recipient software that lets them receive software directly from the host.

An OS/2 node could handle about 100 concurrent sessions with attached nodes, while the mainframe-based XCOM/SDS software handles about 1,000 sessions, Sheik said.

XCOM/SDS includes a 5K-byte terminate and stay resident (TSR) program that helps DOS workstations get around the large memory required to support LU 6.2. The program takes a signal from the SDS server that a transfer is ready, then swaps over to hard disk whatever is in the workstation's random-access memory.

LU 6.2 code is then shipped from the server to workstation RAM, the software or data transfer is conducted, and the process is reversed.

To reduce the time and bandwidth required for file transfers, XCOM/SDS uses PKWare, Inc.'s PKZIP data compression software, which supports compression ratios of as much as 5 to 1.

XCOM/SDS will be available at year end. Pricing for the mainframe repository is about $150,000, while Administrative Workstation software costs between $1,000 and $2,000. LAN server software is priced between $5,000 and $7,000. Recipient software costs $495 for DOS and $695 for OS/2 workstations.

Volume prices and site licenses will be offered, and investments in XCOM 6.2 software will be protected, Sheik said.

Vendors ready to unveil wares

continued from page 4

management system for LANs.

Microsoft and Ashton-Tate have had a long-standing relationship regarding SQL Server. Ashton-Tate was originally supposed to be its sole distributor; however, Microsoft has since expanded its SQL Server distribution channel to let other vendors sell the product.

For its part, Apple will use PC Expo to lay out the company's overall networking plans, discuss its Data Access Language (DAL) strategy and unveil a new DAL communications product.

DAL is a connectivity language that lets Macintosh users access information in non-Macintosh data bases using the familiar Macintosh interface.

Blythe Software, Inc. will also be present at the Apple presentation to unveil a new product based on DAL. When Blythe first licensed the technology in early April ("Apple licenses DAL language to 5 firms," *NW,* April 8), the company said it would develop a tool kit that would let in-house developers write their own DAL client applications. Analysts predict that this is the product Blythe will be unveiling.

Apple said it will not announce any details of its much rumored relationship with IBM. The two companies have reportedly been working to create a new LAN operating system and are said to be hammering out a technology exchange that would let Apple use IBM's Reduced Instruction Set Computer chips in its next Macintosh.

Other highlights of the show will include Eicon Technology Corp.'s release of an Open Systems Interconnection gateway. Designed to run concurrently with the company's existing Systems Network Architecture Gateway software, the OSI Gateway will let users connect MS-DOS, Microsoft Windows and OS/2 personal computers on NetWare, LAN Manager and Network Basic I/O System LANs to X.25 packet-switched networks.

Nissan adds new net applications

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one of the three credit bureaus, depending on which region the customer is in.

Armed with the credit history of the customer, the host application then determines the status of the applicant and either approves the loan outright, approves it for a lesser amount than requested or asks the dealer for more detailed information — all within about three minutes.

A host of other applications will be supported on the Tymnet network as well, according to Dennis Welsh, manager of dealer consulting at Nissan. Dealers will be able to send files or pick up reports at any time, query the corporate data base for repair information on a vehicle or order new cars.

Among the files dealers can send to headquarters is a listing of their parts inventory, which is then made available to all other dealers on the network. That application, which is already in use, helps dealers find parts that may be in a nearby dealership, rather than ordering a part that is delivered the following day.

Such applications are dramatically increasing the amount of time Nissan dealers spend using the network. Prior to the first dealerships coming on-line three years ago, dealers communicated with the data center about 4,000 hours per month, Welsh said.

"We are now communicating about 12,000 hours a month. That's an increase of 8,000 hours a month in the last three years," he said.

The average Tymnet charge per dealership is $95 per month for an average of nine hours of communication time. By contrast, Nissan's Infiniti Division uses a very small aperture terminal network that costs $300 to $400 a month per dealership, said Evan Wride, manager of Nissan's information services department.

Infiniti dealerships have to be on-line for longer periods of time each day because their applications require more host access and, therefore, they can justify the expense.

MCI, WilTel protest revision

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GE's name from the offering and make the deal available to other similarly situated customers.

To date, AT&T says it has sold its 89 Tariff 12 network deals to about 120 customers, meaning it has offered many of the deals to more than one user.

The substantial revision suggested by AT&T for Bridgestone/Firestone raises serious questions about the viability of AT&T's stated policy to offer all Tariff 12 deals to other customers who want it, critics said. They questioned what would have happened if a second customer had purchased Bridgestone/Firestone's deal.

It seems unlikely that a second user would have been willing to undergo such a major revision, which included increased rates. The alternative, however, would have been to move to another existing deal or have another Tariff 12 network contract written just for the second customer, thereby incurring regulatory delays.

Others argue, however, that AT&T must have the flexibility to negotiate with large customers and satisfy their individual business needs.

Since other carriers such as MCI and US Sprint Communications Co. are allowed to do business exclusively through contracts and not tariffs, they would apparently be able to renegotiate a deal for customers with financial difficulties.

MCI and WilTel could ask the FCC to reconsider its decision allowing the Bridgestone/Firestone revision, but neither carrier has indicated it will pursue that avenue.

MasterCard widens use

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However, Thornhill said using Clearview to avoid recurring problems on circuits is more important to the company.

Discovering performance degradation on certain circuits enables MasterCard to inform carriers to take corrective action before the circuit actually fails and disrupts operations.

In addition, MasterCard can reroute traffic from the faulty line to a backup route if the carrier cannot repair the circuit quickly enough.

"Carriers have taken care of problems we report right away because they believe us when we tell them a problem exists," Thornhill said. Previously, MasterCard used several different tools — including bit error rate testers, modem management and DSU/CSU element management systems — to determine when circuit performance was deteriorating.

But carriers were not always quick to accept the data obtained from those tools and would often duplicate tests before repairing circuits.

Firms retain LAN control

continued from page 19

was too high. "There's been a lot of talk about purchasing outside support services," said a scientific equipment company interviewed for the study.

But "you just don't get the same bang for your buck," the user continued. "Our LANs rarely need servicing, and yet vendors' prices are outrageously high."

According to the study, users did turn to vendors for assistance in several areas — including network design and installation, hardware maintenance and hot line support, as well as some remote network management — but less than vendors predicted. As a result, some vendors will be disappointed by lower than expected service revenues while others may be forced out of business.

It is still a possibility that as more systems are internetworked, users will need outside assistance, Hyland said. But, she added, it is important to consider the other side of that argument.

"Products themselves are getting smarter. More products can be monitored from a central location, for example," Hyland said. "We think internetworking will add a level of complexity but will wind up facilitating remote network management rather than making users' lives more difficult."

Friendly advice

The report concluded with some advice for users recommending a mixed internal/external approach to LAN support.

"First, we believe that money spent up front on design, installation and quality products is well worth it," the study said, specifying that these areas warrant external services. "A good clean installation [for example] can be the difference between 99% uptime and constant outages."

The study went on to recommend that users build both a competent local MIS staff and a centralized MIS network support organization complemented by vendor support in the most critical areas.

"Users should only outsource mature technologies that have no hope of yielding big-time profit impact — such as SNA and voice networks," the study said. "Users should hang on to high-impact technologies that could grant important competitive advantage."

IBM fortifies FEPs, joins NET

continued from page 1

formerly the Communication Systems group — said the company would announce its own multiprotocol router this year.

However, Hancock declined to confirm a widespread rumor that the router would be based on software from Wellfleet Communications, Inc., but acknowledged some third-party software would be used. The bulk of the product, however, is being developed by IBM, she said.

Muscled FEPs

The two new models of the 3745 unveiled last week, the 310 and the 610, will have extra horsepower and memory, which will improve their ability to handle existing and forthcoming high-speed interfaces like the 10M bit/sec Ethernet adapter.

Daniel Sazbon, planning manager at IBM's laboratory in La Gaude, France — where the 3745s are developed — said the new models offer a 50% performance improvement over the 3745 Models 210 and 410. The improvements are the result of a reduced processor cycle time, from 75 to 56 nsec, and an increase in cache memory from 16K to 64K bytes.

The new models do not support more lines than their predecessors, so the extra power goes toward improving performance in terms of passing data through the front end.

Combined with the Buffer Chaining Channel Adapters IBM announced last September, which support higher throughput rates on host links than the 3745's original channel adapter, the new 3745s offer up to 2½ times the performance of the original 3745 models announced in 1988, Sazbon said.

According to Antoine Granatino, director of IBM's La Gaude lab, the new machines would have the horsepower required to support such high-speed links as T-3 and the 100M bit/sec Fiber Distributed Data Interface. He added that those interfaces will be announced within two years.

Like the Model 210, the new 310 is a single-processor unit. The new 610 has the dual-processor design of the existing Model 410. Any model can be field-upgraded to any of the higher level models in the line.

The new controllers are scheduled for October availability.

The Model 310 costs $189,550 or can be rented for $18,960 per month. The Model 610 costs $294,550, or $29,460 per month. Conversion charges range from $42,000 to convert a 210 into a 310 to $147,000 to convert the 210 into a 610.

IBM's new Ethernet LAN Adapter will work with any of the 3745 models but will require a new version of the 3745's Network Control Program (NCP), which is to be announced at a later date.

The 3745 already supports token-ring LANs but cannot pass data between a token ring and Ethernet attached to the same front end without a separate bridge between the LANs.

The Ethernet LAN Adapter fits directly into the 3745. Each adapter supports two Ethernet LANs, and as many as eight adapters can be supported in a single 3745.

The adapter will be available in the third quarter of 1992. It costs $21,420 for the 3745 Models 210, 310, 410 and 610, and $8,030 for the 130, 150 and 170 models.

Frame relay in the cards

Frame relay support is also more than a year away from delivery. Announced as a statement of direction for the 3745, frame relay will be beta-tested in the first quarter of next year but not delivered until late 1992, Granatino said.

IBM announcement highlights

Product	Expected delivery
3745 enhancements	
• New Models 310 and 610	October 1991
• Frame relay interface	4th quarter 1992
• Ethernet interface	3rd quarter 1992
• TCP/IP support	NA
AIX NetView Service Point	July 1991
NetView Performance Monitor	
• Version 1 Release 4.1	Available now
• Version 1 Release 5	February 1992
X25Net Switch packet-switch software*	Available now
Network Equipment Technologies, Inc.	
• Local-area network/Wide-area network Exchange (LWX)	August 1991
• Frame relay support for Integrated Digital Network Exchange line	2nd half 1992

* Developed for IBM by Amnet, Inc. of Framingham, Mass. NA = Not available

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Frame relay will be supported via a planned enhancement to NCP, and no new hardware will be required, he said.

IBM announced it has joined the Frame Relay Implementor's Forum, a vendor group that promotes interoperability of frame relay products and has established a profile for how to implement the options in the frame relay standard. Hancock said IBM will back the forum's specifications and will test the implementation on its own and against other members' products, a process he said typically takes at least six months.

IBM will support a frame relay data terminal equipment (DTE) interface, allowing the 3745 to communicate with data communications equipment (DCE) that supports frame relay, such as T-1 multiplexers and equipment used to offer public frame relay services.

It will not, however, be configurable as DCE, meaning users will be unable to build private frame relay networks out of 3745s. "It's fair to say that DCE is certainly something that would be very useful on the 3745, although we're not announcing it," said Nancy Epple, director of the networking project office in IBM's Networking Systems marketing department.

NET bulks up mux

NET also announced frame relay support last week for its entire line of IDNX multiplexers. Each IDNX will support both the DCE and DTE frame relay interfaces and will be compatible with the 3745's frame relay interface, said Walter Gill, vice-president and chief scientist at NET.

The IDNX will be able to support frame relay due to new packet-over-circuit technology implemented in a high-performance NET packet-switch card. The card transforms the IDNX into a hybrid circuit/packet switch capable of carrying packets of variable sizes, Gill said.

The packet card, along with routing software, an IBM-developed token-ring adapter and an NET Ethernet adapter, comprise the LWX (see "More on the LWX," page 62).

The LWX acts as an internal IDNX LAN router. Gill declined to detail the performance of the LWX in terms of packets per second — a department in which some analysts have said the product lags behind stand-alone routers — but said it was fast enough to fully saturate the eight T-1 trunks it supports.

The LWX, due out in August, will leverage the IDNX's existing dynamic bandwidth-sharing feature. That lets users trade off bandwidth in case of overload or failure between the LWX and IDNX circuit-switched applications according to predefined priorities.

NET is working on a feature that will let the LWX dynamically access additional bandwidth as needed by letting it access spare bandwidth or dial up high-speed, switched services, Gill said.

That will be part of a general IDNX upgrade, he added, although Gill declined to say when it would be announced.

Kelly Services ups service ante

continued from page 1

cessing services at Kelly Services, the network is based around an XP80 Tartan Scanner from Dallas-based Recognition Equipment, Inc., which can read 7,200 documents per hour.

The scanner is connected via Ethernet to three personal computers that run image compression software used to size time sheet images to fit into bills. The images are then uploaded to a mainframe for short-term storage on magnetic disk and later forwarded to optical disks for long-term storage, according to Bellano.

The mainframe sorts the time record images and matches them to the appropriate customer invoices, then prints the consolidated document on one of multiple mainframe-attached Xerox Corp. 4090 printers, which can generate 92 pages per minute.

A token-ring network attached to the mainframe supports IBM Personal System/2 personal computers that customer service employees use to retrieve images of the time records from the mainframe or the optical jukebox for on-line viewing or local printing.

"We deliver temporary services where employees fill out time cards and we bill our customers on a weekly basis," said Bob Thompson, senior vice-president and group executive of administrative operations. "About half of our customers want time cards attached to their invoices, and before this system, we had about 30 full-time people handling that."

About one-third of those people matched invoices to time cards, then stapled and mailed them out, Thompson said. Because of the smaller size of the time cards, the invoices could not be handled by machines that automatically stuff and seal envelopes.

Another third of the employees simply maintained the time cards files, while the remaining third retrieved time cards when customers requested copies after they received their invoices.

"It was a very labor-intensive process," Thompson said.

Making the choice

According to Thompson, Kelly Services decided it was time to revamp the system when American Express Travel Related Services Company, Inc. first implemented its imaging system and started to mail out images of charge receipts instead of the actual receipts.

"When I got my American Express bill, I said to myself, 'We have to do the same kind of thing,' " Thompson said. He contacted American Express to find out who the company dealt with and then contacted that vendor, but the price was too high.

Kelly Services then solicited other vendors' proposals and eventually chose Cincinnati Bell Information Systems (CBIS) in Maitland, Fla., a subsidiary of Cincinnati Bell Telephone, to act as a systems integrator and assemble the network.

Some "vendors offered decentralized solutions that proposed putting optical scanners at our 16 [administrative] locations [throughout] the U.S and Canada," Thompson said. "That [would] cost a lot of money and [wouldn't] offer a viable payback period."

According to Thompson, because the company already had a conduit for routing hard-copy time cards to corporate headquarters, the final decision was to put one high-speed scanner at the corporate site.

In addition to acting as systems integrator, CBIS wrote the core software for the imaging system, which included software for scaling — to reduce the time records to a suitable size for printing — and uploading the documents to optical and magnetic disks.

"The cost went well into seven figures, but the system had a payback of two years," Thompson said, although he declined to be more specific about the final cost. "With a payback of two years, we feel we're saving well over a million dollars a year — on employees, time, storage and mail costs.

"The key for us is it's paying its way," Thompson said. "It's not just pretty, it's cost-effective."

Customer satisfaction

According to the company, Kelly Services customers have had an overwhelmingly positive response to the new billing system. "It's been very successful from a customer point of view," Thompson said. "Before, a customer could have as many as 12 time cards stapled to one sheet. Now it's all on standard paper."

The system has also enabled Kelly Services to turn around customer inquiries more quickly. Before the imaging system was in place, a customer missing a time card, for example, would have to wait up to two days for a response. Now, Thompson said, not only is the problem of missing time cards eliminated, customers' questions are answered online in a matter of seconds.

Some customers have gone as far as to call Kelly Services and ask about the system, saying they were interested in implementing something similar internally. And, he added, some of Kelly Services' competitors have approached CBIS out of a desire to implement an imaging system.

"This is proof to us that it's successful," he said. "But even if the competition wants to do the same thing, they'll still be a good two years behind."

Wang embraces IBM bailout

continued from page 6

its Office 2000 software to these computers.

Wang will sell the AS/400 under IBM's name and port Office 2000 software to the minicomputer as well. Wang will create AS/400 conversion centers staffed by IBM and Wang employees who will develop software tool kits to help users move from Wang VS microcomputers to IBM systems.

Wang pledged to continue building and supporting its own VS mid-range systems for the foreseeable future, although analysts said they expect the VS line to be phased out down the road.

IBM will provide Wang with $25 million up front and will offer additional funding of as much as $75 million during the next few years based on Wang's success in selling IBM products bundled with Wang software. IBM's investment, which has not been earmarked for any particular purpose by Wang, could be converted into Wang stock and give IBM about a 20% stake in the Lowell, Mass., firm.

The IBM-Wang agreement could be a boon for users attracted by Wang's image management and office automation software, but scared off by the company's shaky financial stature. Wang lost $715.9 million last year on sales of $2.5 billion and is expected to report a loss and declining revenue for this fiscal year ending June 30.

David Evancha, director of research at WorkGroup Technologies, Inc., a consulting firm in Hampton, N.H., said the resale deal should give users peace of mind.

"Wang users finally have a direct path to another computer product from a company that they know will be around," he said. This is particularly significant because many Wang customers will soon upgrade the VS computers they have had for years, he added.

But not all users will switch allegiances.

"We've made a strategic investment in Wang systems and software," said Peter LaVenia, director of Delaware's Office of Telecommunications Management in Dover. "If we were to migrate from Wang hardware, we'd be looking at computers to support our [Banyan Systems, Inc.] VINES network, which would not necessarily be IBM's."

IBM officials said the agreement is not a prelude to the acquisition of Wang. Rather, it will provide IBM with an alternative sales outlet for some of its best selling computers and access to Wang technology.

The agreement, which a Wang spokesman described as "open," will likely also give IBM access to some of Wang's imaging technology. However, it is unclear how access to this technology will fit in with IBM's image management system product development, he said.

"I believe that IBM finds Wang's imaging technology and experience intriguing," said Stephen Smith, a partner in the San Francisco office of Broadview Associates, an investment firm. "Wang's done a credible job of opening up imaging applications in the office."

The agreement gives Wang more freedom to focus on developing software rather than hardware, according to Richard Miller, Wang's chairman and chief executive officer.

"This relationship allows us to focus our resources on computing solutions for the office and on our leadership technologies such as integrated imaging," Miller said. ▣

Options leave users wanting

continued from page 2

tems Interconnection Common Management Information Protocol (CMIP) and CMIP over TCP/IP (CMOT). Vendors can write applications that use these protocols, but SNMP has fairly limited capabilities, as its focus is primarily data collection and monitoring. CMIP has a broader focus — monitoring, event control and reporting — but is a long way off.

According to David Thacher, senior product manager for LAN Manager at Microsoft in Redmond, Wash., his company plans to focus on support of SNMP, CMIP and CMOT, and add functionality and tools as dictated by user needs. Microsoft does not plan to offer a centralized network management architecture.

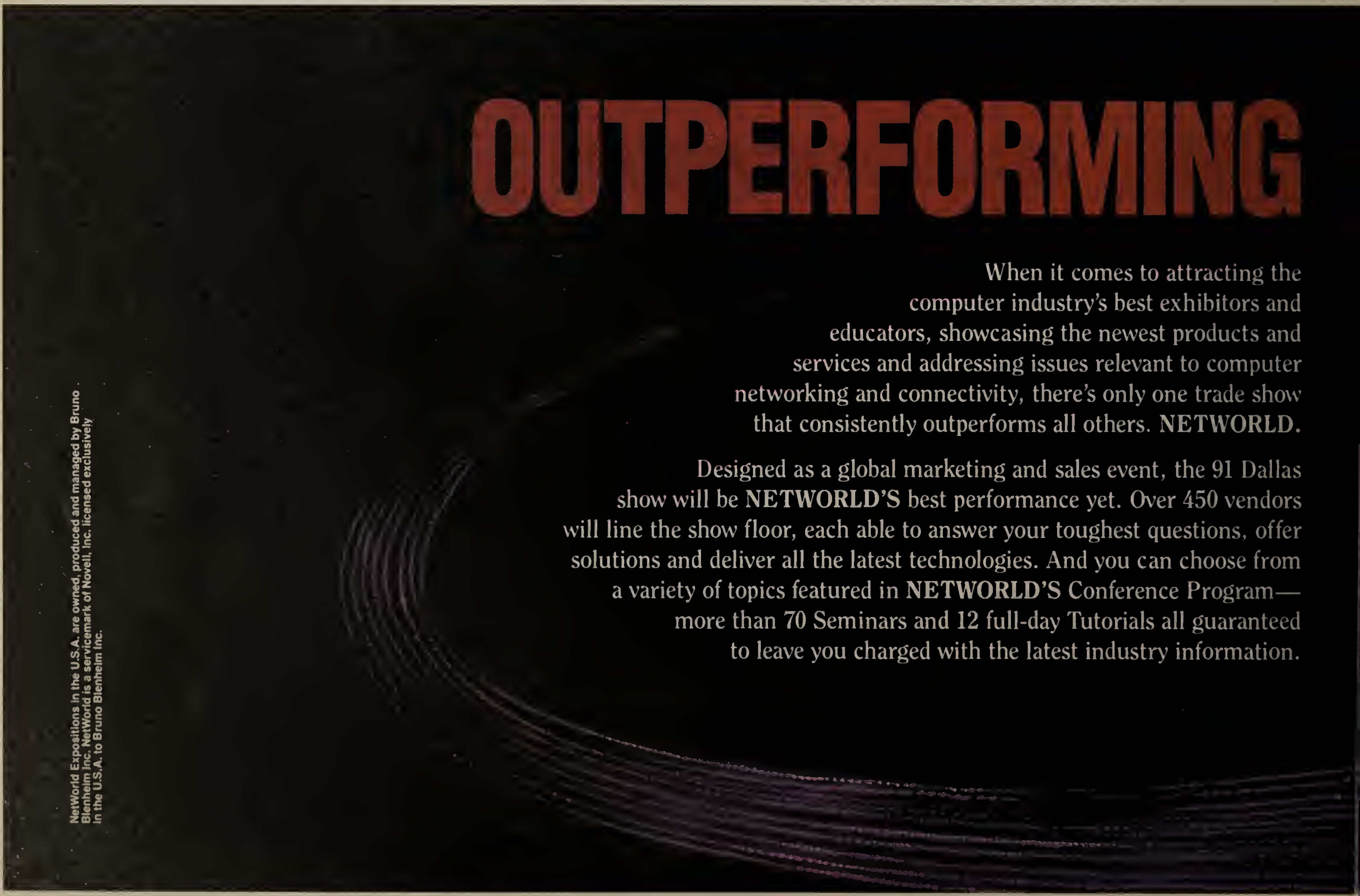
Today, both Novell and Microsoft offer similar net management capabilities through their respective NetWare and LAN Manager operating systems.

According to Thacher, LAN Manager offers a range of administrative tools that provide such information as who is using the network, the number of sessions open on the server, the amount of traffic being sent and how many bad packets have been received, as well as full security security information about who has used which resources on the network.

Microsoft added additional net management features with the release of LAN Manager 2.0 in late 1989 that include the domain name service and replication service, Thacher said. The first lets servers within one domain — not separated by a bridge, router or gateway — share a common directory of all users and applications within that domain without having to query separate servers. Replication service is an administrative tool that helps keep software versions synchronized across different servers.

Microsoft does not yet offer hooks into IBM's NetView management system nor support SNMP, capabilities that Novell announced with its latest release of NetWare. But the company has stated it will provide support for NetView and Digital Equipment Corp.'s Enterprise Management Architecture, in addition to support for SNMP, CMIP and CMOT.

The net management tools both vendors offer today, however, fall short of user needs. "The LAN market as a whole is still really focused on the utility mind-



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set where if you wanted to manage any particular object, you'd have to run the utility associated with that object," said Jamie Lewis, vice-president at Clarke Burton Corp., a consultancy based in Salt Lake City. "Both [Microsoft and Novell] are at the starting gate when it comes to real long-term network management."

One of the features users are looking for is links to other LAN-based systems.

Microsoft has promised coexistence with NetWare but will not provide the means for simultaneous management. "You'll be able to have both running on the same machine, and you'll be able to manage the two, but not through an integrated management tool," Thacher said.

Users also talked of the need for a global naming service. This service, which both companies currently provide, lets administrators manage a group of servers as one domain rather than having to manage each server separately. A global naming service will provide this capability for the entire enterprise, letting the administrator tie in those networks that are separated by bridges, routers or gateways.

Thacher mentioned the advent of a global naming service but did not elaborate. "We're going to focus on distributed management services — a distributed directory service, distributed security service and other distributed management tools," Thacher said. "But at this point, we have no time frames for these."

Novell, at its recent developers conference, also talked about such a naming service, although the company, like Microsoft, did not offer a time frame.

Even with the importance of these capabilities, Lewis stressed that what users need most is a more centralized approach.

"Both companies need to provide a platform and a set of APIs on which management applications can be built by themselves or third parties," Lewis said. These APIs will not only let the management applications work together, but will also tie in other applications important to network management.

But according to Thacher, Microsoft has no intention of providing this type of platform.

"We'll work with [different schemes] to make sure LAN Manager fits in, but it's not our mission to provide network management any more than it's our mission to provide bridges and routers," Thacher said.

Company urges tariff speedup

continued from page 2

the offensive. It has already met with Southwestern Bell Corp., Pacific Telesis Group and GTE, and meetings are scheduled this week with Ameritech, Bell Atlantic Corp. and Nynex Corp.

J.C. Penney is pushing carriers that have not filed ISDN PRI tariffs to do so and encouraging those that have to slash pricing and widen deployment of the service.

Only two regional Bell holding companies, PacTel and Ameritech, offer PRI service under general tariff today.

Prohibitive charges

J.C. Penney's networking staff has reviewed the few existing PRI tariffs and did not like what they saw. They say the recurring monthly charge for PRI is too high and will discourage users from using ISDN to support high-speed data applications.

"They need a PRI tariff that will draw customers toward ISDN," Valliere said. "An ISDN PRI tariff with a very low recurring cost and a usage-sensitive data element would make ISDN a success, but a high recurring charge will keep users away."

J.C. Penney thinks telephone companies should reduce monthly charges for a PRI link by two-thirds, and the telephone companies that J.C. Penney has contacted have been somewhat receptive to the retailer's pitch. "The responses have been favorable," Valliere said.

Currently, J.C. Penney stores use 9.6K bit/sec leased lines to access host-based applications at the company's data processing center. But those links will not be nearly enough for the future, according to Valliere. "The emerging applications we intend to support using PRI could potentially provide an explosion in network usage for the RBHCs," he said.

The RBHCs, however, have concentrated mainly on the Basic Rate Interface (BRI), which is marketed primarily as an enhancement to digital Centrex. J.C. Penney anticipates the need for more bandwidth than is available through BRI's two 64K bit/sec bearer channels and single 16K bit/sec signaling channel. PRI offers 23 64K bit/sec bearer channels and one 64K bit/sec signaling channel.

The retailer considered pursuing customer-specific PRI arrangements with telephone companies but decided it would cost more than tariffed offerings.

"What happens with customer-specific arrangements is that the telephone companies load all the costs of providing ISDN into that package," Valliere said. "That is too expensive and wouldn't work for us."

The company also thought that such an approach would slow ISDN deployment. The retailer welcomes support from other user companies that want to see telephone companies file general PRI tariffs.

Strength in numbers

"We encourage, not discourage other companies from joining us to accelerate the filing of PRI tariffs," Valliere said. "The more of us that play in this process, the closer we get to deploying the applications that are strategic to the Penney company."

Pushing for wide deployment of PRI does not negate J.C. Penney's planned strategic edge.

"We don't see our competitive advantage coming from ISDN technology," Valliere said. "We see ISDN as an enabling technology that will facilitate application deployment. Application deployment is where we will gain a competitive edge."

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User hits AT&T with $10m suit

continued from page 1

duce calling expenditures by enabling traveling executives to route calls through the PBX and over the public net using discounted long-distance services.

But hacker intrusions forced Mitsubishi to turn off the switch's remote access feature last year, forcing executives to use more expensive calling card and operator-assisted services.

"Knowing of the potential for unauthorized use, AT&T sold a System 85 PBX without warning of the potential problems," the suit alleges. "Now after the inevitable occurred, AT&T seeks — improperly — to collect hundreds of thousands of dollars for charges incurred as a result of this unauthorized use."

For its part, AT&T declined to discuss specific allegations in the suit but contends that the action is without merit. "I can't think of another instance [where a user sued a vendor over toll fraud]," said an AT&T spokesman.

The battle between users and vendors over who should pay for toll fraud has heated up in recent months as losses continue to mount across the industry.

In May, a number of major users asked the Federal Communications Commission to establish new rules increasing carrier liability for unauthorized calling charges ("Toll fraud victims tell FCC carriers are unresponsive," *NW*, May 6).

Tale of woe

Mitsubishi's problems started two years after the initial installation of its System 85. Beginning last July, personnel authorized to use the remote access feature were unable to make calls through the PBX.

Officials close to the case said the remote access lines were probably tied up by the more than one million attempts hackers had made over time to access the PBX in order to make illegal calls at Mitsubishi's expense.

Mitsubishi officials claim that more than 30,000 of these call attempts were successful and cost the company nearly half a million dollars. A source familiar with the situation who requested anonymity said that when Mitsubishi told AT&T that callers were unable to get through, AT&T diagnosed the problem as inadequate trunking capacity.

New York Telephone Co. employees later blamed the problem on hackers who cracked Mitsubishi's six-digit security codes and used the PBX to call Egypt, Pakistan and other countries.

The source said AT&T instructed Mitsubishi to program its PBX to block international calls, but hackers later reprogrammed the switch to allow calls to foreign countries.

In September 1990, Mitsubishi decided it could no longer operate the remote access feature securely and disabled the feature.

In its suit, Mitsubishi alleges that AT&T never advised it to adopt more stringent security measures.

An AT&T spokeswoman said the carrier's standard practice is to give customers ample warning of the dangers of toll fraud. She added that users typically lose out when they implement poor system maintenance and security procedures. For example, she said a competent systems administrator could curtail toll fraud by checking call detail reports on a daily basis, looking for multiple failed attempts to access the PBX or multiple calls to unusual locations.

The AT&T spokesman added that previous FCC rulings have upheld the principle that users, not carriers, are liable for toll fraud charges.

The FCC issued its most recent decision on May 29, when it found Chartways Technologies, Inc. liable for $81,789 in charges for unauthorized calls routed through its Northern Telecom, Inc. PBX and over AT&T's public network. ◘

Service allows EDI over X.400

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national's first step toward interconnecting leading LAN messaging systems via SprintMail.

The Sprint Message Xchange service essentially provides an X.400 gateway between cc:Mail and SprintMail. This will allow cc:Mail users to send messages to any one of 350,000 mailboxes on the SprintMail network or to other E-mail users whose systems support X.400 connections to Sprint International's public net.

Sherburne said his company will announce similar interconnections to other widely used LAN messaging systems in the near future but would not disclose which systems were under consideration.

The Sprint Message Xchange service contains an address mapping feature that allows cc:Mail users to address messages to SprintMail and other users in the same manner they would address a cc:Mail message.

The EDI/X.400 service is available now at no extra charge for current SprintEDI users. The Sprint Message Xchange will be available in August and will be priced the same as Sprint International's existing X.400 service. ◘

FTS 2000 users air grievances

continued from page 7

That group also questioned the GSA's billing procedures. "Many of the users feel they're not getting accurate bills from GSA," VanDerPloeg said.

Bill Cunnane, the GSA's deputy assistant commissioner, acknowledged that incorrect billing has occurred.

The GSA recently admitted to overcharging the Department of Agriculture by $500,000, expenses that should have been charged to other agencies. The Agriculture Department caught the error through its own billing verification system.

Robert Lewis, chief of the Department of Energy's communications and emergency management branch, served as spokesman for the data networks group, which raised concerns about network outages. "There are too many, and it takes too long to repair service," he said.

FTS 2000 users last week demanded that alternative access means such as very small aperture terminal be provided under FTS 2000. "AT&T needs to provide network access for all remote user/service areas," stated the group in its written recommendation.

Janice Piteo, head of communications for the Agriculture Department's Agricultural Marketing Service, presented the switched voice services report. She said the group's most heated discussion centered on the complaint that AT&T has, on occasion, discontinued service in an area without notifying users.

"Downsizing of the network without the customer knowing is putting him in a difficult situation," Piteo said.

A common theme in the working groups was the need for better communications among federal users, the GSA and AT&T. Cunnane promised to explore the users' suggestions, which included a bulletin board or newsletter to foster better communications.

The forum didn't just focus on problems. Several agency representatives praised AT&T's performance and service during the transition to the FTS 2000 net.

Both VanDerPloeg and Martin Baer, the Social Security Administration's associate commissioner for the office of telecommunications, called AT&T a true partner with the government (see "AT&T meets FTS 2000 users' demands," this page). ◘

AT&T meets FTS 2000 users' demands

DENVER — User demands for modifications to the Federal Telecommunications System (FTS) 2000 contract are yielding improved network service, AT&T's federal customers said last week at their first FTS 2000 User Forum meeting.

Such capabilities as advanced 800 number routing and call reporting — not part of the original FTS 2000 contract — have recently been delivered due to contract modifications, according to attendees at the forum, which was held for users of Network A, the portion of FTS 2000 operated by AT&T.

The Department of Health and Human Services last week became the first Network A agency to begin using these advanced 800 features.

Kim Davenport, AT&T product marketing manager, said demand from the Social Security Administration (SSA), a large 800 service user, was a key factor in getting the General Services Administration and AT&T to hammer out an agreement for adding advanced 800 services to the FTS 2000 contract.

By September, SSA, which now uses MCI Communications Corp. 800 services, plans to transition its 800 numbers to FTS 2000 as an AT&T customer in accordance with the federal mandatory use law for FTS 2000. SSA, which handles about 300,000 800 calls a day, was unhappy about possibly using the more limited 800 service under the original FTS 2000 deal.

Provision of other important services, such as fractional T-1 and X.25 gateways, has yet to be negotiated by AT&T and the GSA, the contract administrator (see graphic, page 74).

AT&T's proposed FTS 2000 changes

Under review by the GSA:

- X.25 gateways to packet networks
- Fractional T-1
- Dynamic multipoint video
- Reduced lead times for videoconferencing reservations
- Improved billing for 800 access to packet-switched service
- Dedicated transmission service
- Multipoint service

Future AT&T proposals expected to include:

- X.75 gateways to public networks
- T-3 service
- EDI service
- Federal Telecommunications System 2000 backbone and access diversity

SOURCE: AT&T, SILVER SPRING, MD.
GRAPHIC BY SUSAN J. CHAMPENEY

Representatives from AT&T, the GSA and the federal user community attending the FTS 2000 Network A User Forum agreed that the government's long-distance contract is a living document requiring continual change to keep it vital.

"GSA and AT&T need to develop new procedures to modify the contract to reduce the time for change," said Robert Lewis, chief of the Department of Energy's communications and emergency management branch.

For one thing, FTS 2000, negotiated in 1988 between AT&T, the GSA and US Sprint Communications Co., must be updated in order to keep pace with the carriers' most recent commercial offerings. Also, government users want to eliminate troublesome clauses in the FTS 2000 contract.

"The way the contract reads now, AT&T can't be reimbursed more for a diversely routed circuit than [for] a normal circuit," said Dave Bittenbender, chief of telecommunications at the Environmental Protection Agency.

Even when agencies are willing to pay more, the contract prohibits additional expenditures.

In some cases, AT&T has swallowed the difference in order to accommodate users.

But both AT&T and Bittenbender noted that negotiations with the GSA to make the FTS 2000 contract more flexible are under way.

— *Ellen Messmer*

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Strategic or convenient?

continued from page 1

Novell will gain added authority in the corporate IS arena with IBM's blessing, but observers worry that the partnership could cause problems for the LAN vendor. There is concern that Novell management could be distracted, even overwhelmed, by IBM's demands and could lose touch with the needs of existing customers, developers and resellers.

"Novell has captured the bottom end of the market but now needs IBM to own the top," said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C.

IBM's plan

IBM realized that lost LAN sales were threatening its client/server vision, in which departmental LANs work hand in hand with its larger systems, insiders said. By joining forces with Novell, IBM can ensure that Novell LANs are positioned as complements to its larger systems and not as replacements for them.

IBM's key LAN Server product has met with acceptance in larger corporate accounts requiring sophisticated multitasking and data base interoperability capabilities. But Novell's momentum was continuing unchecked and IBM needed to get its client/server message out to customers that bought into NetWare.

"If IBM didn't do it, they were going to lose," said Michael Millikin, vice-president and chief technologist at Patricia Seybold Office Computing Group in Boston. "For IBM, it's another attempt at account retention."

"The alliance helps IBM because, as a competitor, they had less of a chance to influence Novell," said Bill Strouse, president of the Silicon Valley Novell User Group.

NetWare, hampered by wide-area communications shortcomings and the lack of a global naming scheme, poses only a limited threat to IBM's unfolding enterprise network vision, analysts said.

IBM also may have been motivated by the sheer economics of the deal. By giving NetWare to its sales force, IBM can avoid losing LAN deals that would have jeopardized sales of its Personal System/2 personal computers, workstations and token-ring hardware, as well as its mid-range processors.

By working closely with Novell, IBM can ensure a role for mid-range systems such as the Application System/400, as well as workstations like the RISC System/6000, as servers in NetWare networks. What's more, IBM sales representatives gained a new credibility with the huge base of NetWare users.

But Millikin raised doubts about whether NetWare and Novell's Internetwork Packet Exchange (IPX) protocol really have a place in IBM's long-range plans. "This is not just account control; this is vendor control," he said.

Other analysts concurred, saying that the relationship may be more tactical than strategic from IBM's standpoint.

Kevin Moonan, marketing and services director for IBM's Networking Systems unit, acknowledged that people could view the arrangement in that manner but denied it was IBM's intent. "This is a watershed event. It reflects changes," Moonan said. "All of us have to start working together. We realize that one vendor can't meet all customer needs."

Moonan said this is a "critical relationship for IBM," adding that IBM would have some 1,800 Certified Novell Engineers by year end.

Problems for Novell?

With IBM's backing, NetWare has gained added strength over rivals such as Microsoft Corp.'s LAN Manager while Novell has won access to new corporate accounts and IBM's sales and support organization. But the IBM relationship holds some risks for the LAN market leader, analysts say.

Craig Burton, chief executive officer of the Clarke Burton Group, a consultancy in Salt Lake City, warns that "IBM is neutralizing Novell management's time up and down the organization" and that Novell doesn't yet have the infrastructure to manage a relationship of this proportion.

"Novell's plans will be altered by IBM, not by design but by default," Burton said. "That's just the nature of that kind of relationship."

Millikin agreed that one of the dangers of the relationship is that "IBM is going to smother Novell with hugs," dominating Novell's time to such an extent that it could hurt other strategic relationships, which are a core component of Novell's strategy to date.

Novell is already showing preference to IBM by conceding to a full port of native NetWare for IBM's OS/2 and AIX rather than relying simply on Portable NetWare, which offers less functionality.

Even though IBM licensed Portable NetWare last week, Moonan explained it is just a stopgap measure to get a product to market. He said a full port of native NetWare is planned for AIX and OS/2 by the end of 1992 (see "IBM, Novell ink Portable NetWare licensing deal," this page).

On the distribution side, Novell risks alienating the channel that made it strong. Even though efforts are being made to avoid channel conflicts and spread the commission dollars around, IBM's resale of NetWare could eventually be a threat to Novell's upper tier platinum resellers.

In a recent interview, Darrell Miller, executive vice-president of Novell, voiced assurances that Novell would ably manage the IBM relationship. Miller also stressed the level of commitment between the two companies, adding that they will make cooperative announcements almost every quarter, especially in the communications areas.

Analysts predict that the next announcement will be extending NetView monitoring capabilities to NetWare. ◼

IBM, Novell ink Portable NetWare licensing deal

WHITE PLAINS, N.Y. — IBM last week announced that it has licensed Novell, Inc.'s Portable NetWare in order to develop a version of the network operating system for its RISC System/6000 Unix workstation line.

The licensing agreement is an extension of the strategic relationship between IBM and Novell announced in February. Portable NetWare is Version 3.11 of NetWare designed to run on specific computer platforms.

Portable NetWare for the RISC System/6000 will allow the Reduced Instruction Set Computer machines to act as servers in NetWare networks and will give NetWare client systems access to AIX applications, according to IBM officials.

IBM expects to introduce Portable NetWare for the RISC System/6000 by year end, according to a spokeswoman for the company.

IBM is developing a version of Portable NetWare for the RISC System/6000 to bring NetWare support to its customers sooner than would be possible with a port of native NetWare, according to Kevin Moonan, IBM networking systems director.

Ports of native NetWare for AIX Version 3 and OS/2 are ahead of schedule, according to both IBM and Novell officials. IBM and Novell officials said they expect those offerings to be ready by the end of 1992.

The work of porting native NetWare to AIX and OS/2 will be handled largely by Novell but development of Portable NetWare for the RISC System/6000 will be handled by IBM. IBM officials also said they are considering porting IBM's LAN Server network operating system to the RISC System/6000.

— *Eric Smalley*

CLI announces new Rembrandt

continued from page 6

$4,000 and is optimized to operate at 384K bit/sec and less.

Application Package Two costs $8,000 and adds support for CCITT Full Common Intermediate Format, which improves the clarity of Px64-based videoconferences at speeds of 384K bit/sec and higher. Application Package Three costs $12,000 and supports all of these standards, plus CLI's new CTX Plus compression algorithm, which supports videoconferences between Rembrandt II/VPs at speeds ranging from 384K to 2.048M bit/sec.

Application Package Four costs $21,500 and adds support for CLI's Rembrandt compression algorithm, which enables the Rembrandt II/VPs to communicate with the older Rembrandts.

Rembrandt II/VPs equipped with Application Package One cost about the same as the Rembrandt II/06s, while Rembrandt II/VPs equipped with Application Package Four cost about $25,000 less than comparably configured Rembrandts.

The Rembrand II/VPs "will soundly position Compression Labs as the leader at the high-end of the marketplace," Lill said.

In related news, BT North America this week will announce plans to sell in the U.S. a videoconferencing system designed by parent company British Telecommunications PLC and made by GPT Video Systems under a licensing arrangement. GPT Video Systems current sells the systems in the U.S.

Lill said it will be difficult for GPT Video Systems to compete against BT North America in the U.S. because British Telecom has more resources and holds the license for the product.

"British Telecom will basically put a bullet in [GPT's] head," Lill said. GPT Video Systems sold $5 million of videoconferencing systems in the U.S. last year.

But Richard Couchman, general manager of GPT Video Systems, a unit of GPT, Ltd., denied that it would impact his company's sales. "The U.S. is a huge market and there will be several [vendor] entries," Couchman said. He argued that BT North America won't hurt them any more than any other company and that being the manufacturer of the product will give GPT Video Systems the advantage. ◼

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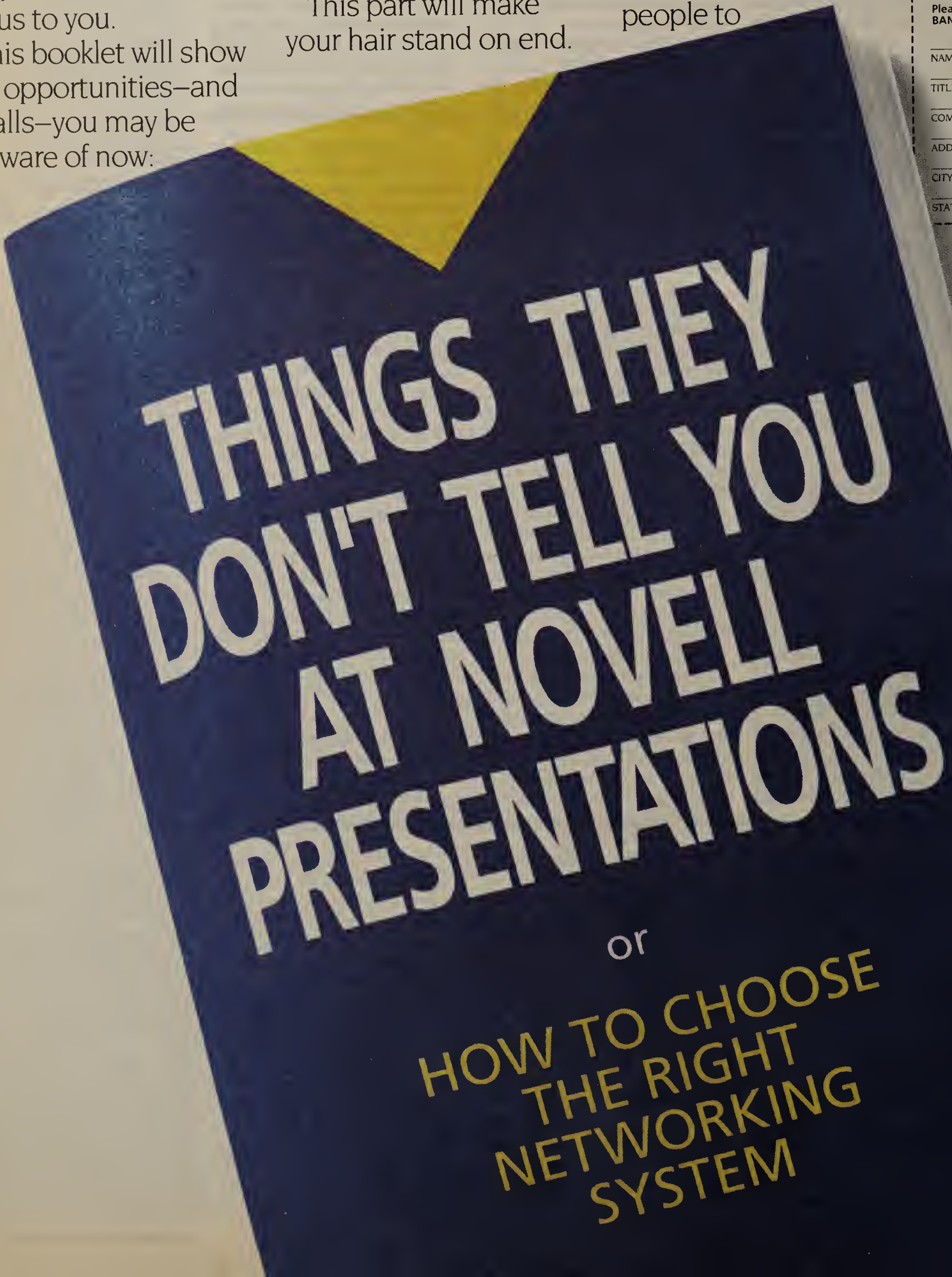

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